

VOLUME ONE/NUMBER THREE/ \$150 US: PM45]

vertex

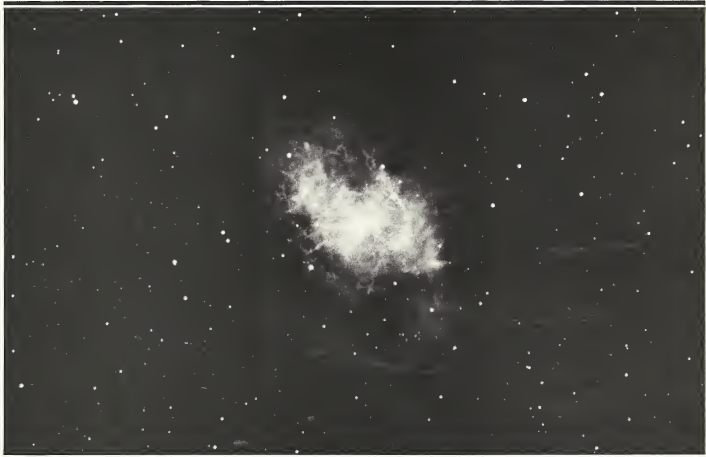
THE MAGAZINE OF SCIENCE FICTION



New Novelettes by
LARRY NIVEN
and A. E. VAN VOGT

Vertex Interviews
POUL ANDERSON

Vertex Previews
THE APOLLO/SOYUZ
MISSION



CRAB NEBULA

Avery few centuries a stellar catastrophe takes place, an explosion the force of which is strong enough to put to shame the most violent hydrogen-fusion reaction. The utter destruction of a star—a supernova. Three have been recorded in our galaxy; in 1604 A.D., in 1572 A.D., and, probably the most spectacular, in 1054 A.D.

At the highpoint of a supernova explosion the star is emitting light at a fantastic rate—some 200 million times the light output of our sun. The light from such a supernova reached Earth on July 4, 1054, as the star which today is merely a blue fragment heading towards white dwarfdom in the center of the Crab Nebula (above) blew wide open. For two years this supernova burned so brightly that it was clearly visible in the daytime sky.

As a star “burns” its hydrogen is fused into helium, releasing energy. The helium sinks to the core, like an “ash,” then, as more and more helium accumulates, gravitational energy eventually sets

it off, fusing it into carbon. This reaction starts as an explosion, but the force is usually damped out by the mass of the star, and soon there is an outer layer of still fusing hydrogen, an inner layer of fusing helium, and an “ash” core of carbon.

Continuing the cycle, soon the carbon begins to fuse, forming oxygen ash, the oxygen ash fuses to form neon, and so on until many concentric shells of fusing atoms, perhaps as far along the scale as nickel, copper and zinc, have been formed. Eventually a star on this path will become a white dwarf, but not all stars are so lucky.

On some stars the temperature at the core suddenly shoots up, gaining *billions* of degrees in a matter of days. What has happened is that the fusion of elements heavier than iron releases tremendous quantities of neutrinos, and as the star shrinks to fill the space left by the departing neutrinos the shrinkage causes tremendous heating. Then, at about 12 billion degrees, fusion is reversed and all the elements present break down into

helium nuclei, absorbing energy instead of releasing it. Without light pressure and the explosive energy of the inner core to counteract gravitational contraction, the outer hydrogen-burning, helium-burning and oxygen burning layers of the are sucked down towards the core at fantastic speed, the gravitational compression releasing tremendous amounts of energy, and, in seconds, the entire remaining nuclear energy in the star is released in one vast explosion—a supernova.

When the initial phase of the explosion is ended, days, weeks or even months later, all that is left is a cloud such as we see when we turn our telescopes towards the constellation Taurus—the Crab Nebula. A cloud of chaotic gas expanding at some two and a half million miles an hour, at the center of which is a small blue fragment, the sole remains of a star which, in seconds, released all the pent-up energy a star such as our sun doles out over billions of years.



*Illustration by
Monte Rogers for
Kessler, fiction by
Herman Wrede—
when living in the minds
of others, man must
be prepared to view
the horrors as well
as the beauty within
the human brain.*

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NOVELETTE



All The Bridges Rusting

Larry Niven

One almost inevitable outcome of the revolution caused by instantaneous matter transmission will be a tremendous amount of pure confusion.

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FEATURE FICTION



Experiment

William Carlson

They didn't know who they were, where they were, or why they were there, but they did know that without knowledge they would surely die.

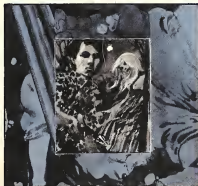
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Future Perfect

A. E. Van Vogt

Any system works only so long as the majority in the system cooperate. When you get a maverick with appeal, though, you also get big trouble.

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SHORT STORIES



Confrontation

Herman Wrede

It sometimes takes a face-to-face meeting to find out just where a person stands, and even then you might guess wrong.

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2000%—A Spaced Oddity

F. M. Busby

Maybe it wasn't all that hard to understand after all—Maybe we just didn't read the signs

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Norman Spinrad

Explaining a rainbow to a blind man would be useful compared to explaining no-time to a normal man.

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Charles Fritch

Never make the mistake of underestimating the power of a woman. You'll forever live to regret it!

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Brave Arms, Strong Arms

Greg Joy

Does survival of the fittest mean that those who cannot adapt to our technical society will not survive?

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Scott Edelstein

Accidents can sometimes have strange outcomes—even cosmic ones.

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Alas, Poor Tidy Toidy Girl

Rachel Payes

One should never assume the standards of home are natural laws. Such an assumption might prove fatal.

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Gregory Benford

Dr. Benford takes a close look at what uses a weightless environment might have—and reaches some startling conclusions!

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Igor Bohassian

In late 1975 the U.S.A. and U.S.S.R. will meet in space—in cooperation, not confrontation, a first in both space and politics.

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Black Hole Mines in the Asteroid Belt

Jerry Pournelle

Far from being a mathematical abstraction, the "black hole" may be one of the most useful of Mother Nature's special oddities.

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PERSONALITY

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Vertex interviews the winner of four Hugos, two Nebulas, and a Cock Robin mystery award—as well as the President of the Science Fiction Writers of America.

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Moment in History

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The Art of Josh Kirby

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One of the most satisfying things about being a science fiction aficionado is being able to say, "see . . . I told you that was going to happen some day."

Of course, the two prime examples which come to mind are atomic energy and the Apollo Program. All serious science fiction fans know that atomic energy was predicted in our stories long before the Manhattan Project, and, what youngster, excited by the new worlds of science fiction, didn't argue with his parents, and possibly even his teachers (things were much less liberal in those days, especially in school), about whether or not man would eventually leave his home planet?

Well, sometimes we don't have to wait quite so long to have our predictions come to pass—or at least the beginnings, the trends, the concepts, become reality. While we can think of things we would rather see happen, it is interesting to note that Bob Silverberg's story in Vertex 1, *Caught In The Organ Draft*, might be a reflection of current trends, rather than a future possibility.

Recently the shortage of transplantable cadaver kidneys reached a crisis point in the U.S., with a UCLA research immunologist reporting a waiting list of over 170 in the Los Angeles area alone. Dr. Gerhard Opelz told a gathering of surgeons recently that one reason for the scanty supply was the failure rate of transplants.

"About half the kidneys fail within a year," he said. Patients with unsuccessfully transplanted kidneys go back on the waiting list. "In 1972," he continued, "only one-third of the patients on the list could be accommodated, and the supply problem is at least partially logistical." He estimated that the national potential donor supply for kidneys is over 100,000, with a nation-wide waiting list of about 2,000. But finding and identifying those donors, together with the legal and time-lapse problems, have presented tremendous obstacles to programs such as UCLA's Organ Transplant Service. It was precisely this situation that formed the social system, with the younger being drafted to provide organs for the older, with compulsory organ registration, in Silverberg's story.

Despite his statements regarding kidney transplant failures, Opelz is optimistic about the prognosis for second transplants. "The chances for second transplants are the same as for the first," he commented, *noting that five is the highest number performed on one person to date*. We can't help but wonder who that person was, and what factors made it possible for him to receive five kidney donations if there are 170 people in the Los Angeles area, and 2,000 people nationwide, still waiting for their first donated kidney.

"It's not that easy to convince people to refer donors," Opelz continued, "but that's what's needed at this point. Though 75 percent of the Los Angeles area patients receive transplants after a waiting period averaging five months, the period is lengthening at an uncomfortable rate."

With transplants becoming a practical reality, with people obviously unenthused about giving up a part of their body, and with the above quoted facts, we wonder how long it will be before the rich and influential are able to buy the organs they need, and how much farther in the future compulsory donation might be. Could it be that Silverberg's prediction is much, much closer than any of us could have guessed? And, friend, what kind of shape are your kidneys in? Got a spare?

Lawrence Neal

Lawrence Neal, Editor

NEWS & REVIEWS

News notes from the world of science and the arts—from space to the prehistoric past—From business contracts to book reviews—from ecology to spacecraft environmental systems.

Briton Runs Car On High-Octane And Pollution-Free Pig Manure

TOTNES, Devon, Eng. For Harold Bate this whole noisy business about the energy crisis and auto pollution is a lot of unnecessary nonsense.

He has been running his car for nearly 17 years now on pollution-free and exceedingly high octane pig manure.

Furthermore, for \$33, including postage, he will send you a converter device and full instructions on how you too can run your car on manure—pig, cattle, chicken, dog or almost any other variety.

Bate is an inventor, and his system works.

He distills methane gas from the manure, puts the gas into small steel cylinders that fit in the trunk of his car, and runs a small hose from the cylinders to the engine.

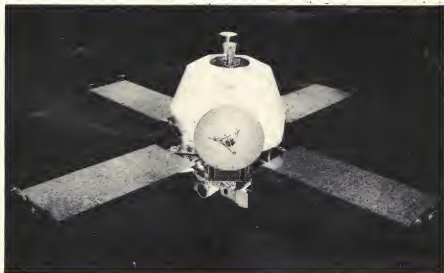
The heart of the system is a small valve that operates on suction created by the carburetor and feeds the methane gas into the engine.

He calculates that about 45.3 kilograms of pig manure produces a volume of methane gas equivalent to about 30 liters of regular gasoline.

He said, "It's very high performance stuff, about 127 octane. You can't get an engine to knock on it, you can even start off in high gear. Coming back from London the other week I got up to 125 k.p.h. on the motorway," which is not bad going, especially for Bate's 1955 Hillman.

There is no pollution, no smell at all, from the methane fuel. A further benefit,

—turn to page 97



2-PLANET LIFE PROBE

Twin Mariner spacecraft to be launched in 1977 on fly-by-probes of both Jupiter and Saturn will carry special instruments to look for life-sustaining chemicals in the Jovian atmosphere.

One of the scientific experiments aboard the 634 kilogram Jet Propulsion Laboratory craft will seek evidence of chemicals called pyrimidines, representing a step in the life-precursor process.

"If the existence of pyrimidines can be confirmed," two University of Maryland researchers told the American Chemical Society, "there is a possibility of producing nucleic acid analogues there by chemical means.

"Since these carry the genetic information for life on earth—and if they should be found—then some form of life might exist on Jupiter."

Dr. Cyril Ponnampuruma and Peter M. Molton told the Washington session the dual missions will be an on-the-scene test of their theory that some form of life exists in Jupiter's atmosphere.

They said they have simulated Jupiter's atmosphere, exposing the gases methane and ammonia, known to exist in the Jovian atmosphere, to water and charges of electricity.

And they have at least tentative evidence, they added, that they have also produced pyrimidines.

In explaining the theory of Jovian life Ponnampuruma has said it probably would be in the form of microbes capable of living suspended in the atmosphere of the giant planet—with little chance for the evolution of intelligent life.

But the finding of even simple life on Jupiter, he said, would greatly increase the chance of intelligent life in other planetary systems.

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Analyzer Has Spinoff Potential

A miniaturized medical diagnostic system originally planned for use aboard manned space stations and now undergoing extensive laboratory tests at the Johnson Space Center, may find its way into everyday clinical use with pediatric and geriatric patients.

A prototype of a miniature fast analytical clinical laboratory system developed by the Atomic Energy Commission, Oak Ridge National Laboratory (AEC-ORNL) for the National Aeronautics and Space Administration provides fast, automated blood analyses by using one-fiftieth the amount of blood required by existing analyzers. At the conclusion of lab tests currently underway at JSC, the AEC-ORNL developed analyzer will be used in clinical situations.

The analyzer was developed to meet NASA's requirements for a small lightweight, biochemical analytical system capable of performing 12 different studies on astronaut blood samples rapidly and with the minimum amount of su-

pervision. Studies which were begun two years ago by the AEC indicated that a miniature analyzer utilizing a modified existing system could be developed to meet NASA's space station requirements.

Available automatic analyzers have been limited to single point biochemical assays on numerous blood samples. The space agency required numerous and rapid chemical analysis on a single crew member blood sample.

The resultant AEC-ORNL studies not only indicated development of such a system was feasible, but would also be useful in ground based laboratories, especially small clinical laboratories, emergency laboratories, pediatric laboratories, mobile laboratories, and other special situations.

Dr. Elliott Harris, Chief of the Environmental Health Branch of JSC's Life Sciences Directorate, described the AEC prototype as a true space-age spinoff. "Initially," Dr. Harris explains, "the

miniature analyzer is light weight (only 13½ kilograms), occupies just one-third square meter, and is close to being totally automated."

One of its benefits, Dr. Harris said, is the small amount of blood required (1/10th of a cc) to complete the 12 simultaneous analyses for which existing analyzers require as much as 5 cc's and perform single analyses.

The present complete AEC system consists of the miniaturized analyzer, several rotors, a portable data printer, an automated sample and reagent loader, and rotor washing station.

Memory's Chemical Basis Found

Scientists at the Baylor University college of medicine have captured animals' memory in a test tube.

Working with rat brains, they have found that the memory of the sound of an electric bell is a chemical thing: an eight-segment chain of six specific amino acids, basic chemicals of life.

The discovery followed work done at Baylor two years ago, when the scientists identified a substance found in the brain of rats trained to avoid the dark.

The chemicals can be isolated from the brain and then injected into other laboratory animals which were not trained to the sound of the bell or to avoid the dark. The untrained animals then behave as though they had been trained.

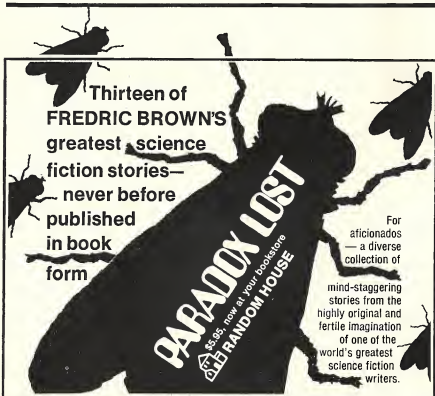
The effort to crack the mind's code of memory was reported by Dr. Georges Ungar and Dr. S. R. Burzysky of Baylor at the 57th annual meeting of the Federation of American Societies for Experimental Biology.

"Deciphering the memory code of the brain is at least as important an objective as breaking the genetic code," the scientists said.

"We collected brains from close to 6,000 habituated rats during the last two years," Burzysky and Ungar reported. After purification, the memory material was shown to be a substance called a peptide.

Peptides consist of chains of amino acids. The information they carry depends on which of 20 amino acids they contain and on the sequence of the amino acids.

"They can be compared to words whose meaning is determined by the order in which the letters follow each other," the scientists said.



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INFLATION TAXES

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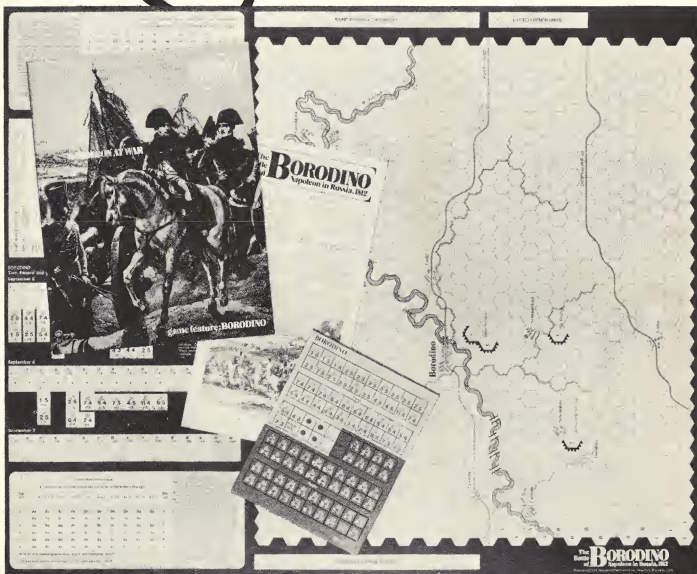
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Post-Apollo Science Report Released

The Lunar Science Institute, which conducts advanced research under the sponsorship of an international consortium of universities, has released an extensive report on "Post-Apollo Lunar Science."

The report, prepared following a 1972 conference of distinguished lunar scientists at the University of California—San Diego, expresses concern that the vast quantities of information available as a result of Apollo moon landings may fall into disuse unless action is taken to continue processing data, handling rock samples, and sponsoring research projects.

"A reasonable return on our national investment in the Apollo program requires extensive study of the information and materials returned by the Apollo missions. It also requires additional accumulation of data leading to a precise definition of the problems to be attacked in the return phase of exploration," the paper says.

The report specifically recommends that the lunar sample processing and storage facilities be fully maintained after Apollo 17 to document and safeguard samples, and to offer assistance to scientists.

In addition, the scientists ask that funds be provided to continue operating the network of nuclear-powered scientific experiments placed on the surface of the Moon during the Apollo landings.

Although the report emphasizes that we must not fail to take advantage of information already gathered, it observes that only a fraction of the lunar surface has actually been investigated.

All 14 lunar landings made by the United States and the Soviet Union have been on the near side of the Moon. More than half of the sites selected by American scientists in 1967 have since been eliminated due to reductions in the budget for lunar exploration.

The most important regions left for investigation are the polar areas and the far side of the Moon, which is markedly different from the side that faces the Earth.

The report recommends that the nation undertake several more modest lunar missions in the post-Apollo period so that gaps in our knowledge might be filled and so that future landing sites might be selected.



In addition to presenting recommendations for future activities, the Post-Apollo report summarizes the major discoveries made so far as a result of the Apollo program:

- mountains on the Moon are arranged in circles, unlike those on Earth, and extensive evidence indicates that the basins and surrounding mountains were formed about 4 billion years ago by the impact of meteorites as large as 1000 kilometers in diameter;

- these lunar basins or "seas" were later filled in by volcanic eruptions;
- since 2.5 billion years ago the surface

has remained much the same;

- the debris from uncountable large and small meteorites covers the surface of the Moon to a depth of a few meters;
- solar winds striking the Moon have not changed noticeably in the past 5 million years, reducing the likelihood that they brought about Ice Ages on Earth;

- the Moon's center of mass is about 2 kilometers closer to the Earth than the body's physical center;

- during the crystallization of lunar rocks, there was very little oxygen on the lunar surface.

THIRD SPACE PROBE TO JUPITER CONSIDERED

With two Pioneer probes en route to the planet Jupiter, the National Aeronautics and Space Administration is considering a third shot next year at a bargain price.

Charles F. Hall, Pioneer project manager at NASA's Ames Research Center near San Francisco, told a Jet Propulsion Laboratory briefing he has asked space agency headquarters in Washington to consider flying a prototype of the probes now aloft.

The spacecraft is a duplicate of Pioneer 10, scheduled to fly past Jupiter next Dec. 3, and Pioneer 11, launched April 5 to rendezvous with the enormous, multicolored planet early in December, 1974.

It was built originally as a test craft to establish the operational reliability of the two probes now flying, Hall explained, and was part of the \$100 million cost listed for two shots, not including launch rockets.

Overall cost of Pioneer 10 and 11, he said, is estimated at about \$125 million or \$62.5 million per shot.

The prototype Pioneer, on the other hand, could be readied for about \$15 million and launched toward Jupiter at a total cost of about \$30 million, Hall pointed out.

"Otherwise it probably would just end up in the Smithsonian Institution or in some other display area somewhere," he added.

BOOK REVIEWS

13: THE FLIGHT THAT FAILED.

Henry S. F. Cooper, Jr.
Dial Press, \$5.95.

Henry Cooper has written two previous books about the Apollo Program, *Moon Rocks* and *Apollo on the Moon*, both of which received excellent reviews. With *13: The Flight That Failed*, though, he has written a book which is a *must* for anyone with any interest at all in space flight or science fiction. In cold, clear, and eminently readable words Cooper traces the flight of Apollo 13, flashing back to the very beginnings of the Apollo Program, inserting live-action segments of the explosion in progress aboard the spacecraft, detailing the frantic efforts to find out what the hell was going on, winding through the breathless wait to see whether or not Thirteen would get back. One of the problems with any government agency, and NASA is no exception, is a tendency to try to cover up goofs. NASA couldn't conceal that Thirteen was in trouble, and they couldn't hide the results of the investigations that followed the return of the aborted mission, but you'd better believe they didn't trumpet the causes of the failure when, months later, the investigations were finally completed. But Cooper has the facts and figures, the people and the causes, and he makes everything "perfectly clear." *13: The Flight That Failed* is a tribute to the space program, an indictment of the space program, a joyous, frightening, and, ultimately, a totally engrossing book.

SURVIVAL PRINTOUT.

Leonard Allison, Leonard Jenkin and Robert Perrault, editors.
Vintage Books, \$1.95.

One of the best collections of science fiction and science articles ever seen in paperback, with pieces by Alfred Bester, Roger Zelazny, Arthur Clarke, Robert Silverberg, R. A. Lafferty, Harlan Ellison, Robert Heinlein, I. S. Shklovskii and others. Well worth the price, and a good addition to any bookshelf.

PARADOX LOST.

Frederic Brown.
Random House, \$5.95.

Frederic Brown died in 1972. He wasn't one of the "super-names" of science fiction. He wasn't in demand for the Johnny Carson Show, nor did he provide expert commentary at any of the Apollo shots. What he did do, though, was write some of the best science fiction and horror stories to be found. This collection, his last book, contains thirteen stories, an appropriate number, most of them old, and all of them excellent, if only to prove that good writing didn't start with the "new wave." Our only regret regarding *Paradox Lost* is that there will be no more Frederic Brown books.

TODAY AND TOMORROW AND.

Isaac Asimov.
Doubleday, \$6.95.

There are some things in this universe which are just not possible. Among them is reprinting an original story or article. If it is original, it isn't a reprint. If it's a reprint, it isn't original. What all this is leading up to is the simple fact that, somewhere, sometime, there must be an original, first-time-ever, Asimov article. Where, though, is beyond me. And, in *Today And Tomorrow And...* we have another collection of reprinted Asimov articles. Well done, interesting, informative, and often very funny; in other words, typical Asimovia, they still are more reprints. We can't help but wonder if even Mr. Asimov isn't getting a little paranoid about the number of Asimov reprints around. In the introduction to this collection he goes out of his way to (not too successfully) try to convince the reader that he isn't really trying to milk every last penny out of each and every article. Maybe, after this book or the next one, or the one after, the milk will dry up, and we'll see a book of Asimov articles we haven't already seen here, there and around.

DEEP SPACE.

Robert Silverberg, Editor.
Thomas Nelson, \$5.95.

Bob Silverberg is one of those rare birds—a man who can write, and write beautifully, combined with a man who can pick and edit the writings of others. Few writers can look at the works of others without picking those works apart, judging them against their own works. Silverberg evidently has this talent, though, because he puts together well above-average anthologies, this one included. The eight stories in *Deep Space* all take place outside our solar system, the putative reason for including these particular stories in one collection. Our only objection to them, despite their excellence, is that we have seen some of them too many times. Granted, they're all first-rate examples of deep space stories, but there are other first-rate examples which, perhaps, haven't had as much exposure, and might have made the book a little more "something to read" and a little less "something to have."

THE BEST LAID SCHEMES.

by Larry Eisenberg.
Collier Books, \$1.25.

What science fiction needs is more books like this and more authors like Eisenberg, especially when it begins to take itself too seriously. Combine good writing, excellent characters, outstanding plots and outrageously funny situations, and you have the 21 stories of *The Best Laid Schemes*.

MIRROR IMAGE.

by Michael G. Coney.
DAW Books, \$95.

The idea's old, creatures who can take any shape, but the treatment is new and the writing is good. Not quite adventure S-F, but with too much plot, too logical a story line, and too definite an ending to be called new wave. In other words, a good book.

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COMPUTOR TO HELP SOLVE MYSTERIES OF U.S. PAST

A USC professor impressed by the computer's ability to analyze the present and even project the future is now trying to use one to unravel the mysteries of America's past.

Dr. John A. Schutz, a professor of history, is engaged in a lengthy study of the Massachusetts Legislature in the period immediately preceding the American Revolution.

He is using a computer to tabulate and correlate a myriad of details about the lives, activities and acquaintances of the legislators who played a leading role in the 18th century breakaway of the American colonies from Britain.

The research will cover the critical period from 1744 to 1776. In that period, according to Schutz, Massachusetts voters elected a total of 1,300 men to the 100-member Legislature. These officials served on a total of about 60,000 committees in the period under study.

Detailed Study

It will be up to the computer to analyze the details about these men to determine their social and economic backgrounds, the types of friends they associated with, their ages, roll call votes, attendance records and their constituents, and to attempt to determine what made these men play such an instrumental role in the revolution.

"The revolution was not caused by executives but by legislators," Schutz said. "The study will not deal with governors because they were not involved—at this time the executives were British representatives chosen by the British government and answerable to it alone."

His study, which started two years ago and will not be completed for another two years, is being funded by the National Endowment for the Humanities and by USC.

He said he has received \$42,000 from the endowment thus far and expects about \$58,000 more before the study is done. So far, USC's share has been about \$50,000 in direct grants and services.

He said use of the computer represents a major breakthrough because it had



never been used before in studying a legislature.

"Historians generally don't like to use machinery," he said. "They prefer to deal with records which they can analyze and think about over a period of time and then write an impressionistic account."

"But the material we are studying here is almost infinite in detail. There is such a tremendous variety of it that it is nearly impossible for a human to keep all this detail in his head. Even keeping it on file cards would not do because you need instant recall."

"The detail is just too mind-boggling. But with a computer you can do it. You just feed the computer questions and within 10 seconds you have the answer. No human researcher can do that."

Schutz, 53 got his Ph.D. in history from UCLA in 1945. Since 1965 he has been teaching at USC.

Author of 4 Books

He is the author of four books on Massachusetts and early American history.

"I am not," he said, "just another Johnny-come-home lately to the area of traditional studies. I have done it before."

"But this time we are doing what has not been done before. We are basically looking at the Massachusetts Legislature to see how the American Revolution started. Most of the work that has been done so far in this area has been largely speculative. With this study we can get a lot of hard data."

Schutz said the study will focus on three major areas of interest—analyzing the people who actually sat in the Legislature, examining the social and economic base of their constituents and the legislative work done by committees.

District Influences

"We would like to determine, for instance, if a certain lawmaker came from a district where farming was more important than fishing," he said. "Would this make him more prone or less prone to support the revolution than a lawmaker who came from the opposite district?"

"We ought to be able to trace the causes and path of the revolution to determine what kinds of people caused the revolution—whether they were fishermen, farmers, ordinary townspeople or college-educated citizens."

Schutz has pored over long and complex British and colonial records in various libraries in Boston, Massachusetts and other New England centers.

He is being assisted in his complex study by Dean Tipps, 25, a former student under him and now a doctoral student in sociology at UC Berkeley, and by Gary Gilbert, a USC computer programmer.

"It has been a long and laborious process," Schutz said.

He said he had devoted the past five years to looking over records that relate to the subject under study.

The information collected up to now has been put on microfilm.

Schutz said by the time all the information has been correlated it should amount to about 200,000 file cards or 2,000 pages of computer printouts.

He plans to use the collected data to publish several detailed historical volumes about the American Revolution and the men who precipitated it as members of the Massachusetts Legislature.

He said preliminary findings indicate the lawmakers in the period 1744 to 1776 averaged 49 years of age. Some of them had as many as 20 children and it was not unusual to find a legislator who had been married five times.

"So far," he said, "we have discovered that men in their middle ages caused the revolution. This was not a young people's revolution, according to the information we have now."

"But this is only an initial finding. I still don't know what the final picture is going to look like."

"However, I think when all the data is in the results may surprise a lot of people and shake some of our myths about who caused the revolution and why. Hopefully, future teaching about the revolution is going to be based on hard data rather than so much speculation as at present."

An important spinoff from the computerized study may be that it will encourage historians to rely more on modern machinery and technology in their research instead of the current emphasis on library work and the traditional approach, Schutz said.

"I should say this approach we are using is the wave of the future," he said.



Poul Anderson, interviewed in this issue, wins another SFWA Nebula award for his novelette, *Goat Song*.

ASIMOV, CLARKE, ANDERSON, RUSS WIN NEBULAS

The Nebula Awards for the best science fiction published during 1972 were announced on Saturday night, April 28, at three simultaneous Nebula Awards Banquets held by the Science Fiction Writers of America in Oakland, New Orleans, and New York City. Winning the Nebula for best novel of 1972 was **THE GODS THEMSELVES**, Isaac Asimov's first new science fiction novel in over a decade. Another of science fiction's most well-known writers, Arthur C. Clarke, also won a Nebula for his novelette, **"A Meeting With Medusa."** **"Goat Song"** by Poul Anderson, current President of the Science Fiction Writers of America, won the Nebula for best novelette of the year, and **"When It**

Changed" by Joanna Russ was selected best short story of the year by the 400 members of the Science Fiction Writers of America.

Dr. Asimov was the featured speaker at the New York Nebula Banquet, novelist Peter S. Beagle spoke at Oakland, and the well-known science fiction writer Lloyd Biggle, Jr. highlighted the program at New Orleans. Toastmasters were writers Harlan Ellison, Don Walsh, Jr. and Richard A. Lupoff. About 200 writers, editors, publishers and scientists attended the unique transcontinental convale to exchange viewpoints and honor the Nebula winners.

Runners-up to the winning works were David Gerrold's novel *When Harlie Was One*, Gene Wolfe's novella *The Fifth Head Of Cerberus*, William Rotsler's novelette *Patron Of The Arts* and James Tiptree, Jr.'s short story *And I Awoke And Found Me Here On The Cold Hillside*.

Atomic Clocks Well Traveled

If you should see a black box strapped in the jetliner seat next to you, plugged into the wall and ticking "don't panic," advises the National Bureau of Standards.

"Just ask it if the plane is on time. It will know."

The black box probably is an atomic clock, and atomic clocks, according to NBS, "get around a lot these days."

Atomic clocks use the vibrations of atoms as "pendulums."

"Since the atomic vibration rate is very constant and relatively unaffected by outside influences, atomic time is incredibly accurate," says NBS. "It is about 100,000 times more accurate than the rotation of the earth as a timekeeping standard."

"What with synchronizing our spacecraft tracking stations and linking the time scales of large radio-telescopes for studies of stellar radio emissions," it is necessary to send atomic clocks on jetliner trips from time to time.

Needs for Check

"For many of these jobs, sophisticated atomic clocks are the only instruments with sufficient timing accuracy. Other methods have too much room for error."

But not even atomic clocks are perfect, and it sometimes becomes necessary for NBS to check "the difference between

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IMBLMS CONTRACT SIGNED

A contract that will bring hospital-quality care to a remote community at a distance from established hospital facilities has been signed by the National Aeronautics and Space Administration and Lockheed Missiles & Space Company.

Under the \$4.9 million contract, Lockheed will design and test a system which will provide comprehensive health care to people in a remote community. By means of advanced medical instrumentation and communications links using voice, data, and television, a profile of a patient's state of health will be transmitted to a central hospital for analysis and diagnosis. "Paramedical" personnel at the patient's remote location can then be advised of the appropriate action to take. The Health Services and Mental Health Administration of the Department of HEW is a joint participant in the program.

The remote health care system—which will apply available space age technology—is a significant example of NASA-industry transfer of space technology. The program was designed originally for space applications under the name of IMBLMS—Integrated Medical and Behavioral Laboratory Measurement System—as a means to transmit medical information from space to physicians on Earth.

Applying the system to a remote community on Earth will have the twofold purpose of proving its potential for space use, and its worth to communities at a distance from central hospital facilities.





ALL THE BRIDGES RUSTING

The development of instantaneous
matter transmission will, for a short
time at least, cause tremendous amounts
of confusion as people try to adapt.
And, without a doubt, there will
arise those "special" situations. . . .

fiction / Larry Niven
artist / Jack Gaughan



Assume slower-than-light-speed starships, then assume faster-than-light transmitters. The invention of one supercedes the use of the other, but what about those ships out there in space, already on the way?

Take a point in space.

Take a specific point near the star system Alpha Centaurus, on the line linking the center of mass of that system with Sol. Follow it as it moves toward Sol system at lightspeed. We presume a particle in this point.

Men who deal in the physics of teleportation would speak of it as a "transition particle." But think of it as a kind of super-neutrino. Clearly it must have a rest mass of zero, like a neutrino. Like a neutrino, it must be fearfully difficult to find or stop. Despite several decades in which teleportation has been in common use, nobody had ever directly demonstrated the existence of a "transition particle." It must be taken on faith.

Its internal structure would be fearfully complex in terms of energy states. Its relativistic mass would be twelve thousand, two hundred tons.

One more property can be postulated. Its location in space is uncertain: a probability density, thousands of miles across as it passes Proxima Centauri, and spreading. The mass of the tiny red dwarf does not bend its path significantly. As it approaches the Solar system

the particle may be found anywhere within a vaguely bounded wave front several hundred thousand miles across. This vagueness of position is part of what makes teleportation work. One's aim need not be so accurate.

Near Pluto the particle changes state. Its relativistic mass converts to rest mass within the receiver cage of a drop ship. Its structure is still fearfully complex for an elementary particle: a twelve thousand, two hundred ton spacecraft, loaded with instruments, its hull windowless and very smoothly contoured. Its presence here is the only evidence that a transition particle ever existed. Within the control cabin, the pilot's finger is still on the TRANSMIT button.

Karin Sagan was short and stocky. Her hands were large; her feet were small and prone to foot trouble. Her face was square and cheerful, her eyes were bright and direct, and her voice was deep for a woman's. She had been thirty-six years old when *Phoenix* left the transmitter at Pluto. She was three months older now, though nine years had passed on Earth.

She had seen a trace of the elapsed years as *Phoenix* left the Pluto drop ship. The shuttlecraft that had come to meet them was of a new design, and its attitude jets showed the color of fusion flame. She had wondered how they made fusion motors that small.

She saw more changes now, among the gathered newspapers. Some of the women wore microskirts whose hems were cut at angles. A few of the men wore asymmetrical shirts, the left sleeve long, the right sleeve missing entirely. She asked to see one man's left cuff, her attention caught by the glowing red design. Sure enough, it was a functional wristwatch; but the material was soft as cloth.

"It's a Bulova *Dali*," the man said. He was letting his amusement show. "New to you? Things change in nine years, Doctor."

"I thought they would," she said lightly. "It was part of the fun."

But she remembered the shock of relief when the heat struck. She had pushed the TRANSMIT button a light-month out from Alpha Centaurus B. An instant later sweat was running from every pore of her body.

There had been no guarantee. The probability density that physicists called a transition particle could have gone past the drop ship and out into the universe at large, beyond rescue forever. Or . . . a lot could happen in nine years. The

station might have been wrecked or abandoned.

But the heat meant that they had made it. *Phoenix* had lost potential energy entering Sol's gravitational field, and gained it back in heat. The cabin felt like a furnace, but it was their body temperature that had jumped from 98.6° to 102°, all in an instant.

"How was the trip?" The young man asked.

Karin Sagan returned to the present. "Good, but it's good to be back. Are we recording?"

"No. When the press conference starts you'll know it. That's the law. Shall we get it going?"

"Fine." She smiled around the room. It was good to see strange faces again. Three months with three other people in a closed environment . . . it was enough.

The young man led her to a dais. Cameras swiveled to face her, and the conference started.

Q: How was the trip?

"Good. Successful, I should say. We learned everything we wanted to know about the Centaurus systems. In addition, we learned that our systems work. The drop ship method is feasible. We reached the nearest stars, and we came back, with no ill effects."

Q: What about the Centaurus planets? Are they habitable?

"No." It hurt to say that. She saw the disappointment around her.

Q: Neither of them checked out?

"That's right. There are six known planets circling Alpha Centaurus B. We may have missed a couple that were too small or too far out. We had to do all our looking from a light-month away. We had good hopes for B-2 and B-3—remember, we knew they were there before we set out—but B-2 turns out to be a Venus-type with too much atmosphere, and B-3's got a reducing atmosphere, something like Earth's atmosphere three billion years ago."

Q: The colonists aren't going to like that, are they?

"I don't expect they will. We messaged the drop ship, *Lazarus II*, to turn off its JumpShift unit for a year. That means that the colony ships won't convert to rest mass when they reach the receiver. They'll be reflected back to the solar system. They should appear in the Pluto drop ship about a month from now."

Q: Having lost nine years.

"That's right. Just like me and the rest of the crew of *Phoenix*. The colonists left the Pluto transmitter two months

after we did."

Q: What are the chances of terraforming B-3 someday?

Karin was glad to drop the subject of the colony ships. Somehow she felt that she had failed those first potential colonists of another star system. She said, "Pretty good, *someday*. I'm just talking off the top of my head, you understand. I imagine it would take thousands of years, and would involve seeding the atmosphere with tailored bacteria and waiting for them to turn methane and ammonia and hydrocarbons into air. At the moment it'll pay us better to go on looking for worlds around other stars. It's so bloody easy, with these interstellar drop ships."

There was nodding among the newstapers. They knew about drop ships, and they had been briefed. In principle there was no difference between *Lazarus II* and the drop ships circling every planet and most of the interesting moons and asteroids in the solar system. A drop ship need not be moving at the same velocity as its cargo. The *Phoenix*, at rest with respect to Sol and the Centaurus suns, had emerged from *Lazarus II*'s receiver cage at a third of lightspeed.

"The point is that you can use a drop ship more than once," Karin went on. "By now *Lazarus II* is one and a third light years past Centaurus. We burned most of its fuel to get the ship up to speed, but there's still a maneuver reserve. Its next target is an orange-yellow dwarf, Epsilon Indi. *Lazarus II* will be there in about twenty-eight years. Then maybe we'll send another colony group."

Q: Doctor Sagan, you were as far from Sol as anyone in history has ever gotten. What was it like out there?

Karin giggled. "We were as far from any star as anyone's ever gotten. It was a long night. Maybe it was getting to us. We had a bad moment when we thought there was an alien ship coming up behind us." She sobered, for that moment of relief had cost six people dearly. "It turned out to be *Lazarus*. I'm afraid that's more bad news. *Lazarus* should have been decelerating. It wasn't. We're afraid something's happened to their drive."

That caused some commotion. It developed that many of the newstapers had never heard of the first *Lazarus*. Karin started to explain . . . and that turned out to be a mistake.

The first interstellar spacecraft had been launched in 2004, thirty-one years ago.

Lazarus had been ten years in the

building; but far more than ten years of labor had gone into her. Her life support systems ran in a clear line of development back to the first capsules to orbit Earth. The first fusion-electric power plants had much in common with her main drive, and her hydrogen fuel tanks were the result of several decades of trial and error. Liquid hydrogen is tricky stuff. Centuries of medicine had produced suspended animation treatments that allowed *Lazarus* to carry six crew with life support supplies sufficient for two.

She was lovely . . . at least, her re-entry system was lovely, a swing-wing streamlined exploration vehicle as big as any hypersonic passenger plane. Fully assembled, she looked like a haphazard collection of junk. But she was loved.

There had been displacement booths in 2004; the network of passenger teleportation had already replaced other forms of transportation over most of the world. The cargo ships that lifted *Lazarus*' components into orbit had been fueled in flight by JumpShift units in the tanks. It was a pity that *Lazarus* could not take advantage of such a method. But conservation of momentum held. Fuel droplets entering *Lazarus*' tanks at a seventh of lightspeed would tear them apart.

So *Lazarus* had left from the end of the Coriass accelerator, an improbably tall tower standing up from a flat asteroid a mile across. The fuel tanks—most of *Lazarus*' mass—had been launched first. Then the ship itself, with enough maneuvering reserve to run them down. *Lazarus* had left like a string of toy balloons, and telescopes had watched as she assembled herself in deep space.

She had not been launched into the unknown. The telescopes of Ceres Base had found planets orbiting Alpha Centaurus B. Two of these might be habitable. Failing that, there might at least be seas from which hydrogen could be extracted for a return voyage.

"The first drop ship was launched six years later," Karin told them. "We should have waited. I was five when they launched *Lazarus*, but I've been told that everyone thought that teleportation couldn't possibly be used for space exploration because of velocity differences. If we'd waited we could have put a drop ship receiver cage on *Lazarus* and taken out the life support system. As it was, we didn't launch *Lazarus II* until—" she stopped to add up dates. "Seventeen years ago, 2018."

Q: weren't you expecting Lazarus to pass you?

**"Phoenix had lost potential energy entering Sol's
gravitational field, and gained it back in heat . . . their body
temperature jumped from 98.6 to 102 in an instant."**

"Not so soon. In fact, we had this timed pretty well. If everything had gone right, the crew would have found a string of colony ships pouring out of *Lazarus II* as it fell across the system. They could have joined up to explore the system, and later joined the colony if that was feasible, or come home on the colony return ship if it wasn't."

Q. As it is, they're in deep shit.

"I'm afraid so. Can you really say that on teevee?"

There were chuckles at her naïveté.

Q. What went wrong? Any idea?

"They gave us a full report with their distress signal. There was some trouble with the plasma pinch effect, and no parts to do a full repair. They tried running it anyway—they didn't have much choice, after all. The plasma stream went wrong and blew away part of the stern. After that there wasn't anything they could do but set up their distress signal and go back into suspended animation."

Q. What are your plans for rescue?

Karin made her second error. "I don't know. We just got back two days ago, and we've spent that time travelling. It's easy enough to pump energy into an incoming transition particle to compensate for a jump in potential energy, but the only drop ship we've got that can absorb potential energy is at Mercury. We couldn't just flick in from Pluto; we'd have been broiled. We had to flick in to Earth orbit by way of Mercury, then go down in a shuttlecraft." She closed her eyes to think. "It'll be difficult. By now *Lazarus* must be half a light year beyond Alpha Centaurus, and *Lazarus II* more than twice that far. We probably can't use *Lazarus II* in a rescue attempt."

Q. Couldn't you drop a receiver cage from Lazarus II, then wait until Lazarus has almost caught up with it?

She smiled indulgently. At least they were asking intelligent questions. "Won't work. *Lazarus II* must have changed course already for Epsilon Indi. Whatever happens is likely to take a long time."

Teevee was mostly news these days. The entertainment programs had been largely taken over by cassettes, which could be sold devoid of advertisements, and which could be aimed at more selective audiences.

And newspapers had died out; but headlines had not. The announcers were saying things like *Centaurus planets devoid of life . . . colony ships to return . . . failure of Lazarus scout ship engines . . . rescue attempts to begin . . . details*

in a moment, but first this word . . .

Jerryberry Jansen of CBA smiled into the cameras. The warmth he felt for his unseen audience was genuine: he regarded himself as a combination of entertainer and teacher, and his approximately twelve million students were the measure of his success. "The Centaurus expedition was by no means a disaster," he told them. "For one thing, the colony fleet—which cost you, the taxpayer, about six hundred and sixty million new dollars nine years ago—can be re-used as is, once the UN Space Authority finds a habitable world. Probably the colonists themselves will not want to wait that long. A new group may have to be trained."

"As for the interstellar drop ship concept, it works. This has been the first real test, and it went without a hitch. Probably the next use of drop ships will not be a colony expedition at all, but an attempt to rescue the crew of *Lazarus*. The ship was sending its distress signal. There is good reason to think that the crew is still alive."

"Doctor Karin Sagan has pointed out that any rescue attempt will take decades. This is reasonable, in that the distances to be covered are to be measured in light-years. But today's ships are considerably better than *Lazarus* could ever have been."

"You idiot," said Robin Whyte, Ph.D. He twisted a knob with angry force, and the teevee screen went blank. A few minutes later he made two phone calls.

Karin was sightseeing Earth. The UN Space Authority had had a new credit card waiting for her: a courtesy she appreciated. Otherwise she would have had to carry a sackful of chocolate dollars for the slots. Her hands quickly fell into the old routine: insert the card, dial, pull it out and the displacement booth would send her somewhere else.

It was characteristic of Karin that she had not been calling old friends. The impulse was there, and the worn black phone book with its string of nine-year-old names and numbers. But the people she had known must have changed. She was reluctant to face them.

There had been a vindictive impulse to drop in on her ex-husband. *Here I am at thirty-six, and you—stupid. Ron knew where she had been for nine years, and why bug the man?*

She had cocktails at Mr. A's in San Diego and lunch at Scandia in Los Angeles and dessert and coffee at Ondine in Sausalito. The sight of the Golden

Gate Bridge sparked her to flick in at various booths for various views of all the bridges in the Bay area. For Karin, as for most of humanity, Earth was represented by a small section of the planet.

There had been changes. She got too close to the Bay Bridge and was horrified at the rust. It had never occurred to her that the San Francisco citizenry might let the bridges decay. *Something* could be done with them: line them with shops à la London Bridge, or landscape them over for a park, or run drag races. . . . They would make horribly obtrusive corpses. They would ruin the scenery. Still, that had happened before. . . .

Some things had not changed. She walked for an hour in King's Free Park, the landscaped section of what had been the San Diego Freeway. The trees had grown a little taller, but the crowds were the same, always different and always the same. The shops and crowds in the Santa Monica Mall hadn't changed . . . except that the city had filled in the space between the curbs, where people had had to step down into the empty streets.

She did some shopping in the Mall. To a saleslady in Magnin's West she said, "Dress me." That turned out to be a considerable project, and it cost. When she left her new clothes felt odd on her, but they seemed to blend better with the crowds around her.

She did a lot of flicking around without ever leaving the booth, the ubiquitous booth that seemed to be one instead of millions, that seemed to move with her as she explored. It took her longer to find the right numbers than it did to dial. But she flicked down the length of Wilshire Boulevard in jumps of four blocks, from the coast to central Los Angeles, by simply dialling four digits higher each time.

She stopped off at the County Art Museum in Fresno and was intrigued by giant sculptures in plastic foam. She was wandering through these shapes, just feeling them, not yet trying to decide whether she liked them, when her wrist phone rang.

She could have taken the call then and there, but she went to a wall phone in the lobby. Karin preferred to see who she was talking to.

She recognized him at once. Robin Whyte was a round old man, his face pink and soft and cherubic, his scalp bare but for a fringe of white hair over his ears and a single tuft at the top of his head. Karin was surprised to see him now. He was the last living member of the team that had first demonstrated teleportation in 1992. He had been pres-

***"With his mind's eye he saw six coffins, deathly still,
and six human beings frozen inside. Three men, three women,
frozen, falling through space forever."***

ident of JumpShift, Inc. for several decades, but he had retired just after the launching of *Lazarus II*.

"Karin Sagan?" His frown gave him an almost petulant look. "My congratulations on your safe return."

"Thank you." Karin's smile was sunny. An impulse made her add, "Congratulations to you, too."

He did not respond in kind. "I need to see you. Urgently. Can you come immediately?"

"Concerning what?"

"Concerning the interview you gave this morning."

But the interview had gone so well. What could be bothering the man? She said, "All right."

The number he gave her had a New

York prefix.

It was evening in New York City. Whyte's apartment was the penthouse floor of a half-empty building. The city itself had lost half its population during the past forty years, and it showed in the walls of dark windows visible through Whyte's picture windows.

"The thing I want to emphasize," said Whyte, "is that I didn't call you here as a representative of JumpShift. I'm retired. But I've got a problem, and pretty quick I'm going to have to take it up with someone in JumpShift. I still own enough JumpShift stock to want to protect it."

His guests made no comment on his disclaimer. They watched as he finished

making their drinks and served them. Karin Sagan was curious and a bit truculent at being summoned so abruptly. Jerryberry Jansen had known him too long for that. He was only curious.

"You've put JumpShift in a sticky situation," said Whyte. "Both of you, and the rest of the news media too. Karin, Jerryberry, how do you feel about the space program?"

"I'm for it. You know that," said Jerryberry.

"I'm in it," said Karin. "I feel no strong urge to quit and get an honest job. Is this a preliminary to firing me?"

"No. I do want to know why you went into so much detail on *Lazarus*."

"They asked me. If someone had asked me to keep my mouth shut on the subject I might have. Might not."

"We can't rescue *Lazarus*," said Whyte.

There was an uncomfortable silence. Perhaps it was in both their minds, but it was Jerryberry who said it. "Can't or won't?"

"How long have you known me?"

Jerryberry stopped to count. "Fourteen years, on and off. Look, I'm not saying you'd leave a six man crew in the lurch if it were feasible to rescue them. But is it economically infeasible? Is that it?"

"No. It's impossible." Whyte glared at Karin, who glared back. "You should have figured it out, even if he didn't." He transferred the glare to Jansen. "About that rescue mission you proposed on nationwide teevee. Did you have any details worked out?"

Jerryberry sipped at his screwdriver. "I'd think it would be obvious. Send a rescue ship. Our ships are infinitely better than anything they had in 2004."

"They're moving at a seventh of light-speed. What kind of ship could get up the velocity to catch *Lazarus* and still bring them back?"

"A drop ship, of course! A drop ship burns all its fuel getting up to speed. *Lazarus II* is doing a third of lightspeed, and it cost about a quarter of what *Lazarus* cost; it's so much simpler. You send a drop ship. When it passes *Lazarus* you drop a rescue ship through."

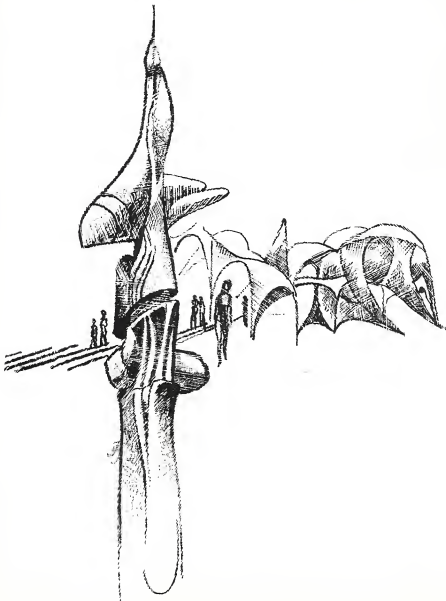
"Uh huh. And how fast is the rescue ship moving?"

"... Oh." *Lazarus* would flash past the rescue ship at a seventh of lightspeed.

"We've got better ships than the best they could do in 2004. Sure we do. But, censored dammit! They don't travel the same way!"

"Well, yes, but there's got to be—"

"You're cheating a little," Karin said.



**"Everyone in the world lives next door to his boss,
his mother-in-law, the girl he's trying to drop, the guy he's
fighting for a promotion. You can't move away!"**

"A ship of the *Lazarus* type could get up to speed and still have the fuel to get home. Meanwhile you send a drop ship to intercept *Lazarus*. The rescue ship drops through the receiver cage, picks them up—hmm."

"It would have to be self-teleporting, wouldn't it? Like *Phoenix*."

"Yah. Hmm."

"If you put a transmitter hull around something the size of *Lazarus*, fuel tanks included, you'd pretty near double the weight. It couldn't get up to speed and then decelerate afterward. You'd need more fuel, more weight, a bigger hull. Maybe it couldn't be done at all, but sure as hell we're talking about something a lot bigger than *Lazarus*."

There had never been another ship as big as *Lazarus*.

Karin said, "Yah. You'd ditch a lot of fuel tanks getting up to speed, but still—hmm. Fuel to get home. Dammit, Whyte, I left Earth nine years ago. You've had nine years to improve your space industry! What have you done with them?"

"We've got lots better drop ships," Whyte said quietly. Then, "Don't you understand? We're improving our ships, but not in the direction of a bigger and better *Lazarus*."

Silence.

"Then there's the drop ship itself. We've never built a receiver cage big enough to take another *Lazarus*. *Phoenix* isn't big; it doesn't have to go anywhere. I won't swear it's impossible to build a drop ship that size, but I wouldn't doubt it either. It doesn't matter. We can't build the rescue ship. We don't even have the technology to build *Lazarus* again! It's gone, junked when we started building drop ships!"

"Like those damn big bridges in San Francisco Bay," whispered Karin. "Sorry, gentlemen. I hadn't thought it out."

Jerryberry said, "You've still got the Corliss accelerator. And we still use reaction drives."

"Sure. For interplanetary speeds. And drop ships."

Jerryberry drained his screwdriver in three swallows. With his mind's eye he saw six coffins, deathly still, and six human beings frozen inside. Three men, three women. Someone must have thought that a scout crew might just decide to colonise the Centaurus system without waiting. Fat chance of that now. Three men, three women, frozen, falling through space forever. They couldn't possibly have been expecting rescue. Could they?"

"So we don't get them back," he said.

"What are we holding, a wake?"

"They knew the risks they were taking," said Whyte. "They knew, and they fought for the chance. We had over a thousand volunteers at the start of training, and that was after the preliminary weeding-out. Jerryberry, I asked you before about how you felt about the space program."

"I told you. In fact—" He stopped.

"Publicity."

"Right."

"I thought I was doing you some good. Public support for the space program isn't heavy right now, and frankly, Doctor Sagan, your report didn't help much."

She flared up. "What were we supposed to do, build a planet?"

"Failure of the first expedition. No planets. A whole colony fleet on its way home without ever having so much as seen Alpha Centaurus! I know, it's safer for them, and better not to waste the time, but dammit!" Jerryberry was on his feet and pacing. There was an odd glow in his eyes, an intensity that could communicate even through a teevee screen. "I tried to emphasize the good points. Now—I damn near promised the world a rescue mission, didn't I?"

"Just about. You weren't the only one."

He paced. "I'm pretty good at explaining. I have to be. I'll have to tell them—no, let's do it right. Robin, will you go on teevee?"

Whyte looked startled.

"Tell you what," said Jerryberry. "Don't just tell them why we can't rescue *Lazarus*. Show them. Set up a cost breakdown, in dollars and years. We all know—"

"I tell you it isn't cost. It—"

"We both know that it *could* be done, if we gave up the rest of space industry and concentrated solely on rescuing *Lazarus* for enough years. R and D, rebuilding old hardware—"

"Censored dammit! The research on a drop ship that size alone—" Whyte cocked his head as if listening to an inner voice. "That is one way to put it. It would cost us everything we've built up in the past thirty years. Jerryberry, is this really the way to get it across?"

"I don't know. It's one way. Set up a cost estimate you can defend. It won't end with just one broadcast. You'll be challenged, whatever you say. Can you be ready in two days?"

Karin gave a short, barking laugh.

Whyte smiled indulgently. "Are you out of your mind? A valid cost estimate

would take months, assuming I can get anyone interested in doing a cost estimate of something nobody really wants built."

Jerryberry paced. "Suppose we do a cost estimate. CBA, I mean. Then you wouldn't have anything to defend. It wouldn't be very accurate, but I'm sure we could get within a factor of two."

"Better give yourselves a week. I'll give you the names of some people at JumpShift; you can go to them for details. Meanwhile I'll have them issue a press release saying we're not planning a rescue mission for *Lazarus* at this time."

JumpShift Experimental Laboratory Building One, was a tremendous pressurized Quonset hut. On most of his previous visits Jerryberry had found it nearly empty; for too many of JumpShift's projects are secret. Once he had come here with a camera team, and on that occasion the polished, smoothly curved hull of *Phoenix* had nearly filled the building.

He had never known exactly where the laboratory was. Its summers and winters matched the northern hemisphere, and the sun beyond the windows now stood near noon, which put it on Rocky Mountain time.

Gemini Jones was JumpShift's senior research Physicist, an improbably tall and slender black woman made even taller by a head of hair like a great white dandelion. "We get this free," she said, rapping the schematic diagrams spread across the table. "The Corliss accelerator. Robin wants to build another of these. We don't have the money yet. Anyway, we can use it for the initial boost."

On a flattish disc of asteroidal rod a mile across, engineers of the past generation had raised a tower of metal rings. The electromagnetic cannon had been firing ships from Earth orbit since 2004 AD. Today it was used more than ever, to accelerate the self-transmitting ships partway toward the orbital velocities of Mars, Jupiter, Mercury...

Jerryberry studied the tower of rings, wider than any ship ever built. "Is it wide enough for what we've got in mind?"

"I think so. We'd fire the rescue ship in sections, then put it together in space. But we'd still have to put a transmitter hull around it."

"Okay, we've got the accelerator, and we'd use standard tanks. Beyond that—"

"Now hold up," said Gem. "There's an easier way to do this. I thought of it this morning. If we do it my way we

**"But what use were the worlds of other stars?
Even the worlds of the solar system had given no benefit to Man,
except for Venus, which made an excellent garbage dump."**

won't need any research at all."

"Oh? You interest me strangely."

"See, we've still got this problem of building a ship big enough to make the rescue and then decelerate, and a drop cage big enough to take it. But we already know we can build self-transmitting hulls the size of *Phoenix*. What we can do is put the deceleration fuel in *Phoenix* hulls. We wouldn't need an unreasonably big drop cage that way."

Jerryberry whistled. He knew what *Phoenix* had cost. Putting a rescue ship together would be like building a fleet of *Phoenixes*. And yet—

"Robin was wrong. We could do that. We've got the hardware."

"That's exactly right. I figure maybe twenty *Phoenix* hulls full of suspended hydrogen, plus a *Phoenix*-type ship for the rescue, plus a couple more hulls to hold the drive and the rigging to string it all together. You'd have to assemble it after launch and accelerate it to a seventh of lightspeed, using a couple hundred standard tanks. Then take it apart, stow the rigging, and send everything through a *Lazarus II* drop ship one hull at a time."

"We could do it. Does Robin know about this?"

"Who's had time to call him? I only just thought of this an hour ago. I've been working out the math."

"We could do it," Jerryberry said, his eyes afire. "We could bring 'em back. All it would take would be time and money."

She smiled indulgently down at him; at least she always seemed to, though her eyes were level with his own. "Don't get too involved. Who's going to pay for all this? You might talk your bemused public into it if you were extending man's dominion over the stars. But to rescue six failures?"

"You don't really think of them that way."

"Nope. But somebody's going to say it."

"I don't know. Maybe we should go for it. Those self-transmitting hulls could be turned into ships afterward."

"No. You'd drop them on the way back."

Jerryberry ran a hand through his hair. "I guess you're right. Thanks, Gem. You've done a lot of work for something that isn't ever going to get built."

"Good practice. Keeps my brain in shape," said Gem.

called. She said, "I've been wondering if you need me for the broadcast."

"Good idea," said Jerryberry. "If you're willing. We could tape an interview any time you're ready. I'll ask you to describe the circumstances under which you found *Lazarus*, and use that to introduce the topic."

"Good."

Jerryberry was tired and depressed. It took him a moment to see that Karin was too. "What's wrong?"

"Oh . . . a lot of things. We aren't just going to forget about those six astronauts, are we?"

His laugh was brittle. "I think it unlikely. They aren't decently dead. They're in limbo, falling across our sky forever."

"That's what I mean. We could wake them any time in the next thousand years, if we could get to them."

"That's my problem. We can."

"What?"

"But it'd cost the Moon, so to speak. Come on over, Doctor. I'll show you."

LAZARUS COST	N\$ 2,000,000,000
LAZARUS II COST	N\$ 500,000,000
Phoenix cost	N\$ 110,000,000
Colony (six ships adequately equipped) cost	N\$ 660,000,000

**TOTAL COLONY PACKAGE, INCLUDING COLONY
AND PHOENIX AND SUPPORT SYSTEMS IN**

SOLAR SYSTEM: N\$51,500,000,000

One self-transmitting hull costs N\$ 70,000,000

Twenty-two self-transmitting hulls cost N\$ 1,540,000,000

Interstellar drop ship costs N\$ 500,000,000

R & D costs nothing.

Support systems in solar system: N\$ 250,000,000

TOTAL COST OF RESCUE: N\$ 2,360,000,000

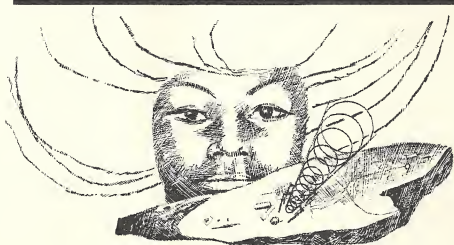
" . . . which is just comfortably more than it cost to build *Lazarus* in the first place, and a lot more than it cost us to not colonise Alpha Centaurus. It wouldn't be impossible to go get them. Just inconvenient and expensive."

"In spades," said Karin. "You'd tie up the Corliss accelerator for a week solid. The whole trip would take about thirty-four years starting from the launching of the drop ship."

"And if it could be done now it could always be done; we couldn't ever forget it until we'd done it. And it would get more difficult every year because *Lazarus* would be getting further away."

"It'll nag us the rest of our lives." Karin leaned back in Jerryberry's guest chair. His apartment was not big: three rooms with doors knocked between them, in a complex that had been a

/turn to page 88



He was at home, doggedly working out a time and costs schedule for the rescue of *Lazarus*, when Karin Sagan



At one time the medical men wondered if the human body could stand long periods of weightlessness. Now they wonder how man manages to withstand gravity.

WEIGHTLESSNESS

article / Gregory Benford

artist / Tom Newsom



Before man ever ventured into space, some planners thought the sensation of weightlessness might prove unbearable. Weightlessness is the same feeling one gets when falling, such as at the top of a roller coaster when the descent begins. In fact, weightlessness is not so terrifying as was feared, but it can be uncomfortable.

In orbit, a spacecraft is falling toward the Earth. It is also speeding parallel to the Earth's surface, and the Earth curves away from the spacecraft because the Earth is a sphere. If the spacecraft moves quickly enough, the Earth "curves away" at just the same rate that the craft falls toward it, so that the craft stays the same distance above the Earth. This is why an astronaut feels himself always falling.

Without weight, the distinction between up and down vanishes. Water floats in little spherical droplets. Pencils and other loose objects float about the cabin, blown by eddies of air. Just after reaching orbit, there is a feeling of having a stuffed head, a fullness that comes from a sudden rise in blood pressure. This is because the heart does not immediately adjust to the fact that it needn't pump as hard as it did on Earth. The body's blood no longer must be pushed against the force of gravity.

A typical response to the first experience of no weight is a giddiness, a new feeling of freedom. An astronaut can effortlessly "fly" across his cabin, twirl in the air or simply float in total relaxation. He is conscious for the first time of how much strain an Earth-bound creature endures just to get through life.

Present spacecraft cabins are cramped and not the ideal place to practice a newfound freedom from gravity. The "space walk," now a standard item on orbital flights, reportedly gives the astronaut a new burst of enthusiasm for weightlessness, as he spins and sails around the outside of the craft. Routine tasks, such as retrieving film canisters, become exciting expeditions.

These are the immediate, positive effects. There are others, not so pleasant.

Feelings of nausea and seasickness sometimes occur, especially if the cabin

revolves slowly. This usually passes as the body's equilibrium and reflexes adjust to new conditions. Asleep, a man automatically assumes the fetal position, floating. Usually astronauts sleep inside a light, ventilated bag to keep them from drifting about the cabin and striking things. Sometimes, strangely, sleeping this way results in a backache.

Most movement requires less effort; men tire more slowly. The body compensates with lessened hunger—a man eats only about two thirds his normal fill. Often his weight drops in space. For reasons not fully understood, the element potassium is lost quickly in orbit and this upsets the mineral balance of the body. The imbalance seems to shrink muscles, causing the heart particularly to grow smaller. The blood also changes, often making fewer white cells. These cells fight infections, so astronauts are more prone to some illnesses. Also, the red cells sometimes are not replaced quickly enough, and their oxygen-carrying function declines. Gradually, in sometimes subtle ways, the delicate balance of processes in the body is upset.

Muscle tone lowers when a man is weightless, because less exertion is required. After a time, this decline overcomes the ease of working and it takes longer for a man to complete a given task. This fact may well set a limit upon the time spent in weightless condition.

When the astronaut returns to a gravity field—the Earth or our moon—his heart strains to readjust to the higher work load. He tires more easily. So far, astronauts' bodies have returned to equilibrium after a few days back on the surface.

Weightlessness can be avoided by spinning the cabin. Centripetal force presses things outward, toward the walls of the cabin, and provides the sensation of weight. This technique will be necessary in long-lived space stations, to avoid the bad effects of weightlessness. A large space station, two-hundred feet in diameter, need only rotate every ten seconds to provide a full Earth gravity at its rim. The people living in such a sta-

tion may come to view weightlessness as a harmless amusement and recreation during their rest periods. If the station is the familiar "wheel" type, with spokes out to the rim, a cylinder at the center would still be weightless. Weightless games may be invented, to make use of the new freedom.

NASA is already projecting that the space shuttle can begin to pay back its investment through tourism, perhaps as early as the late 1980s. Aside from the drama of the flight and the spectacle of Earth seen from orbit hundreds of miles up, one of the major tourist attractions will be weightlessness (or lessened gravity, if the ship spins). A stringent physical examination will be required before takeoff, and full weightlessness may not be used until the passengers have proven they can take it. But in a world jaded with ordinary pleasures and distractions, the experience will be new and unique. It should sell well. The steep price—certainly several thousand dollars or more for a few hours in orbit—will probably deter few. Ask the question of yourself—would you spend the money?

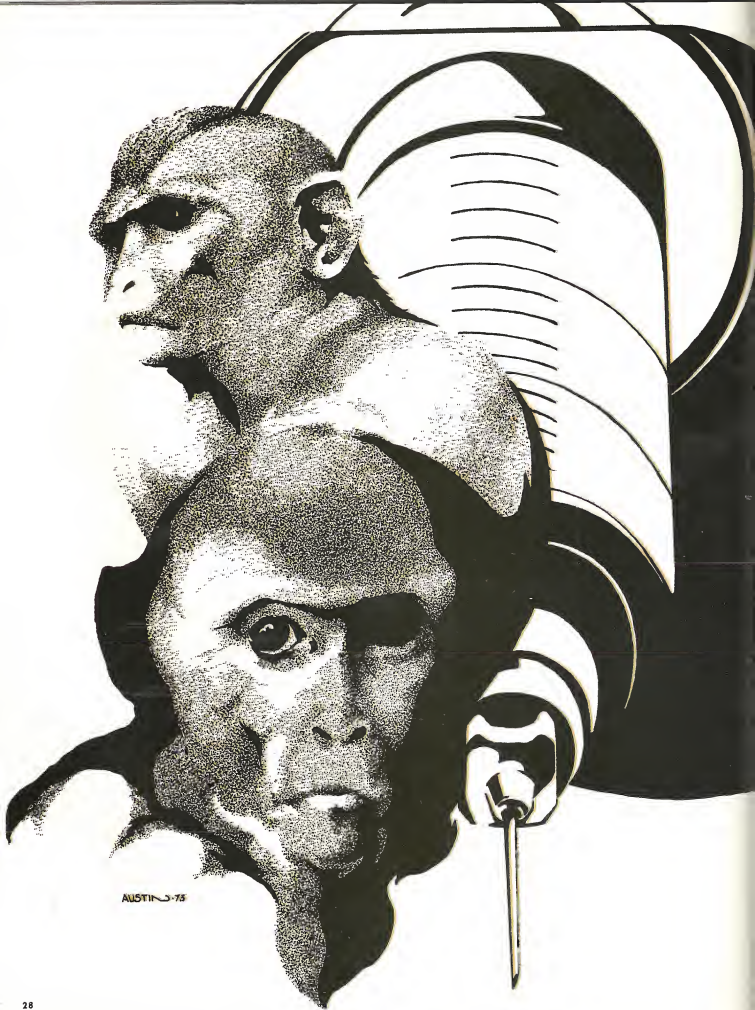
The low-gravity environment available in orbit will also hold out the possibility of lessened strain on heart and other internal organs, particularly the circulatory system. Patients in need of extensive operations might find recovery easier in low gravity. If the high-g strain of getting into orbit aboard a space shuttle can be lessened, it might become feasible to transport patients into orbit for delicate operations and let them recover there for indefinite periods. Inevitably, some would be unable to tolerate the stress of return to Earth on the shuttle. This would lead to the first permanent population in orbit, a colony tied to space by life itself.

If these possibilities come about, weightlessness may be an unsuspected resource of the space program. Instead of the mild hazard it is now, the prospect of liberating man from the grip of gravity could become an attractive side benefit to working, living and doing research in space. **O**

Edward E. White II, pilot for the Gemini-4 spaceflight, floats under weightless conditions outside his craft. He is holding a "Hand-Held Maneuvering Unit," which he uses to control his movements under weightless conditions.

(NASA Photo)





AUSTIN-75



EXPERIMENT

The Zookeeper had them in a cage—the trouble was they didn't know why. They didn't even know who they were, how they got there, who the zookeeper was, or even, for that matter, what they were there for.

fiction / William Carlson

artist / Alicia Austin

They bump into each other. "Oof!" she says.

He reaches out, steadies her.

"Uh—thanks, Mister, uh, it is mister?"

"Yes." He removes his hands from her bare arms.

"Hmm, would be, with that voice! This goddam darkness—you seem pretty strong, uh . . ."

"I'm sorry," he says. "I—don't understand. I seem to have forgotten my name."

"Y'know, I have too! Just came to me, I mean *didn't*, when I tried to think of it. What the hell's going on here, with this darkness and—uh, you still here?" She reaches out, touches his bare chest. "You mind? I feel better touch—uh, you don't seem to have many clothes on."

"I don't believe I have any."

"No, I don't believe you—oh, sorry."

"That's all right."

"You're definitely a mister."

"That is correct."

"You're big all over, aren't you? God, your legs—you work out or something? Jog?"

"No—well, maybe. I don't know. Come to think of it, I don't know anything about—do you mind, Miss? I'm a little ticklish on that left knee."

"Oh, sorry. I'll just work my way up again here."

"Shouldn't we consider—Miss?"

"Umm."

"Please—*Miss!*"

"I see you've noticed that I'm naked—why don't you touch me a little, it might make you less lonely or something. Here." She pulls his arms around her back. "Isn't that nice—sir?"

He moves his hands—up, down. "Very nice!" He presses her against him.

"Now that's more like it! I don't think this floor is too cold, do you?"

"No."

They lie down on the floor and make love. Then they sit up, shoulders touching. "I've done that before," she says.

"So have I—wish I could remember where."

"So do I. I don't remember a home or family or anything, do you?"

"No. I remember mathematical principles, and some physics and chemistry and statics and thermodynamics."

"Really? I remember novels, plays, poems. Shelly. Keats. You've heard of them?"

"Vaguely. You've heard of thermodynamics?"

"Vaguely." He moves. "Hey, where're you going?" She grabs his left foot.

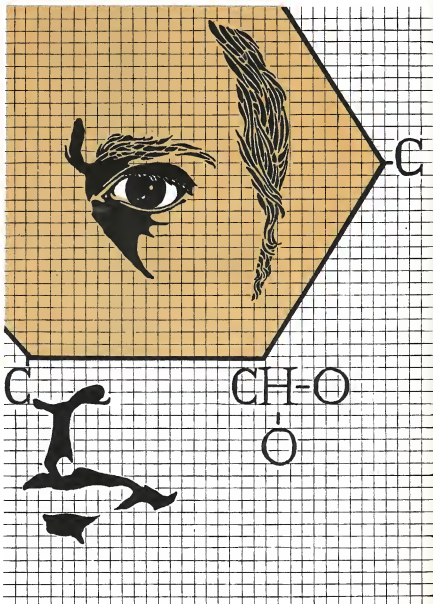
"Examining this floor. Hmm, feels

"George slowly looks around.

They are inside a hemisphere of huge dimensions—his estimate of a two mile diameter cannot be far off.

And if the diameter is two miles, the center point of this dome is a mile high!

It looks it. But, of course, it might be some kind of projection."



something like cork, not so porous, no seams, can't pick it with my fingernail. Strange odor, barely perceptible—where on earth could we be?" He gets up. "Let's go, Miss. It's time to start getting some answers."

She tries to pull him back down, but he is much stronger and pulls her up instead. "All *right*—take it easy, Tarzan! There—that'll be your name! Make me plain Jane, but it'll have to do."

"Could you call me something else?"

"Sylvester?"

"Not Sylvester."

"How about—George?"

"That will do."

"Good. I'll stick with Jane—no, let's make it Joan. OK?"

"OK—Joan."

Still holding her hand, he takes a step, but she hangs back. "God, this darkness—how can any place be so dark?"

"Probably one of two things. Either this place is absolutely light tight, or we're both blind."

"W—what?"

"Either this place—"

"I heard you, I heard you! Blind—oh God!" She grips his hand with both of hers.

"Yes. Whoever erased our memories could also have blinded us, temporarily or permanently. Blind, or in absolute darkness—how could one tell?"

"I don't know!" Joan cries. Again she hangs back, as George tries to move forward. "Where are we *going*?"

"If I don't know where we are, and I can't see any destination, how can I possibly know where we're going?"

"That's what I thought! Yet you just take off, just like that! Here we are stark naked, helpless, where or why or what kind of place this is we don't know—maybe there's a bottomless pit three steps ahead, or big traps with sharp teeth, or mines to explode, or some kind of knife thing coming out of the floor. We don't know what there is, we can't see anything, yet you just blithely walk off!"

"I wouldn't say *blithely*. I have evaluated the situation, and it is obvious that we need more data."

"Oh, *data*. I think we should stay right here!"

"But if we move we might come to some light, or sound, or be able to feel something that will help us. The risk is justified by the data we may acquire."

"You talk like a computer, you know that? Good thing you don't make love like one!"

"On the other hand, I could explore by myself, keeping within sound—"

"Oh no you couldn't! I'm not letting you out of touch, brother!" Joan is silent for nearly a minute. "OK, I capitulate. You're the leader and the father-figure and all that. Bold and brave, just like in the story books—lead on, Sir George! Just don't let go of my hand."

George steps firmly ahead. Joan follows, clinging to his hand and talking about the imagery of darkness and light in *Paradise Lost*. They walk for what seems a long time. Joan talks about the first canto of the *Inferno*, where Dante is lost in a dark wood. Suddenly George stops, and she bumps into him. "Now what?"

"Shhh, I want to listen."

"Did you hear something?"

"Shh." George kneels to examine the floor.

"You know, the silence in this place is almost—loud."

"Same material," he says, getting up.

"And this damn darkness is so dark it's almost visible. Don't you like paradoxes, George—no, I guess not. I do, I think they stretch the mind. Wasn't it Jonathan Swift—or was it John Donne, who—"

"Excuse me, Joan—I don't care which it was."

"Well, for—"

"And furthermore," he says firmly, "I don't care what they said about paradoxes or anything else. I think we should both be listening as we walk—we need all the clues we can get—and we can't hear anything with you chattering like a teletypewriter. Now let's go." He steps off.

Joan follows, still holding his hand. After several minutes she says, "I hate you." George doesn't answer. "You could have told me in a nice way instead of being such a crude pig about it." Another long silence. "Next time you try to rape me, brother, you're gonna have a fight on your hands."

George says nothing, and Joan trudges beside him in silence. After what seems like hours she tugs at his hand. "Can we rest?"

"Yes."

"They sit down. 'Can I say something?'"

"Yes, but first I want to say I'm sorry about—back there."

"You're really sorry?"

"Yes."

"OK—I forgive you. It's just—I'm scared! And talking seemed to help."

"I understand."

Joan presses his hand. "This building must be awfully big, we've been walking for hours."

"But have we been walking in a

straight line?"

"I don't know. Have we? That's your department."

"Can't tell without landmarks," he says.

Joan leans against his shoulder. "I'm tired and thirsty and my feet hurt and I don't understand one single thing about this place and I just want to close my eyes and go to sleep and wake up somewhere where there's *light*."

George puts his arm around her. "I know. It's frustrating. We've hardly enough data for a reasonable first approximation."

"God, I can't get over the way you talk!" She reaches for his ear, finds it, tweaks it. "You're not a robot, are you, George?"

"No. But I seem to know about computers; I must have worked with them—before. Are you ready to move on?"

"I guess. God, what a stinking miserable mess."

"The situation is not without interest though."

"Shit," says Joan.

George leads the way. They are scarcely into their stride when he crashes into it. "Ouch! *Damn* it!" "You can swear!" cries Joan.

"You goddam right," he says, rubbing his nose.

Joan drops his hand and feels, up, down, crosswise. "It's a wall!"

"It is," he agrees, touching it, smelling it. "Apparently the same material as the floor." He strikes it with his fist. "Solid."

"Now what?" asks Joan.

"First I'll hoist you up," He does. "Can you feel the ceiling?"

"Nope—let me down!" George slides her down the front of his body. "Hm, nice trip. OK—*now* what?"

"We follow the wall."

"Now wait a minute, George. You're the boss—I admit it—but can we just sit here and talk a minute?"

"OK."

They sit, backs against the wall. "George, I'm not saying it's not right to walk around and investigate the—external situation here. When you're put in a prison you try to get out. That's normal. But my question is, *why were we put here?* Naked, our memories partly gone? This thing is obviously somebody's plan, and if we could figure out what kind of plan, you know, what the hell this might be all about, wouldn't we be ahead?"

"We would. Do you have any ideas?"

"Well, not exactly."

"I have."

"I might have known," Joan sighs.

"We're obviously not in a conventional prison or insane asylum, so unless this is an hallucination—"

"I don't think so, George. I mean, you have to accept your senses—I touch the floor, the wall, you, myself—I'm hungry, thirsty—we've made *love* for God's sake—no, we are here in a big dark building of some kind—I'm sure of it!" And even if we aren't we have to act as though we are, because—because what else can we do?"

"I agree."

"So where does that leave us?"

"In a zoo. Or a laboratory. Somewhere under observation."

"But who, and why, and where?"

"Who knows? Someone or something with huge resources, that's certain. Where? Underground somewhere? Why? Some kind of test? Preparation for something? What?"

"You know what I'm thinking about, the Zookeeper! If you're right, he's watching us right now. Could he see us in the dark?"

"Certainly. Infrared light."

"You think—you don't think—he would listen to us? I mean if we addressed him directly?"

"He might. If there is such a person. I wouldn't count on it."

"I'm going to try!" Joan clears her throat. "OK, Mr. Zookeeper, we know you're out there—uh, I just want to tell you that we—I think this is very stupid, keeping us in the dark this way and fooling around with our minds—why not just treat us decently and talk to us—we'll tell you what you want to know, and—I guess that's all. For now."

There was a long silence.

"He's not going to answer," Joan says.

"No."

"You son of a bitch!" she shouts. "There, I feel better. Now what do we do?"

"Follow the wall."

They set off, George walking close to the wall, brushing it at various levels with the fingertips of his right hand, while Joan as usual holds firmly to his left.

They walk on and on. "God," mumbles Joan, "how big is this place? We've got to come to another wall pretty soon."

George stops. "Ah! Stupid!"

"What? I was ju—"

"No, no—I was referring to myself! There may not be another wall, Joan. If the building is circular, for example, or elliptical, the wall's curve wouldn't

be detectable to us in the darkness."

"You mean we could just be walking round and round the outside wall?"

"That's right."

"Jesus. I hate this place! I want to see!"

George is silent for several minutes. "All right, here's what we'll do. We'll mark this spot and start walking again. But this time I'll count my steps, so when I get back we will have established the approximate shape and dimensions of the building."

"What good will that do us?"

"The more data, the better," George says firmly.

"Oh. One question. How do we mark the spot?"

"Well, I know you're tired, and—"

"No."

"I could go faster alone, I'd probably be back before—"

"No."

"In that case, I hope you feel as much pressure in your bladder and bowels as I do."

"In my—oh, I see! God, George."

"Can you think of another way?"

"No. Where do you want me to go?"

"Let me measure from the wall." He guides her to the spot, lets go of her hand, steps away. "Do as much as you can," he adds.

"Oh, shut up." She does hers and then he does his. As soon as he finishes she grabs his hand. "C'mon, let's get going—yours smells worse than mine."

"That," George says, "is a matter of opinion."

They walk and walk and rest and walk some more. Joan's increasing tiredness slows them down, but George continues to try to take three foot steps. "Are you still counting?" Joan asks after a long time.

"Still counting."

"How far have we gone?"

He stops. "Four miles and—"

"Four miles!"

"And 462 steps. I count to 1,760 and keep track of the miles on my right hand as I check out the wall."

"God, no wonder I'm tired. Can we rest a little? As long as we're stopped?"

"Sure." They rest and walk and walk and rest and walk. Joan leans heavily on George. Finally she becomes completely exhausted, stumbles, and begins to sob, "I, sorry, George, I've tried—I've really tried—but I just can't go on." At that moment, George steps in it.

They move away from their marker and sink to the floor. "How big?" murmurs Joan as she cuddles against him.

"If it's circular, the circumference is

a little over six miles, the diameter about two miles, the area a little over three square miles; if elliptical, it would depend—"

"Never mind," says Joan, "it's a big cell—that's all I know. God, I'm tired. I'm even too tired for sex." In a few minutes she falls asleep, and shortly after, George does too.

Look, George, look, look—god-dammit, will you wake up!" Joan pounds on his chest.

George holds her off with one arm as he opens his eyes. He blinks, sits up sharply, rubs his eyes, looks.

"Isn't it fantastic, George? We can see! You're not bad looking, you know—God, I'm thirsty—just look at this incredible place!" George looks around, then turns back to Joan. She smiles slowly as he studies her face and body. "Do I pass?"

"You pass."

"Am I beautiful?"

"Your body is beautiful; your face is—interesting, striking."

"My nose is too long, isn't it? I've been feeling it."

"It's part of what makes you striking."

"I wish I had a mirror—do you like dark hair?"

"Very much."

"George, I am scared! What kind of place is this?"

George slowly looks around. They are inside a hemisphere of huge dimensions—his estimate of a two mile diameter can not be far off. And if the diameter is two miles, the center point of this dome is a mile high! It looks it. But of course it might be some kind of projection. The surface of floor and dome appear absolutely smooth, light tan in color, no windows or light source noticeable—the even illumination seems to come from the surface itself.

Joan puts her arms around George. "I'm really scared, George. I'm glad we can see, but I feel so *small*—the Zookeeper, he's so, so much in control." She presses her face into his chest. "Oh, thank God you're here—without you... Will you love me, dear? Please love me, please!"

George loves her.

Afterward, they sit quietly, George with his back against the wall, Joan on his lap. "Did you get a good look, you bastard!" she suddenly explodes.

"What?"

"Talking to the Zookeeper."

"Oh."

"I hope the sonofabitch got—hey, look over there!" George looks. About fifty

"Here we are, stark naked,
helpless, where or why or what
kind of place this is we
don't know—maybe there's a
bottomless pit three steps ahead,
or big traps with sharp teeth,
or mines to explode, or some
kind of knife thing coming out of
the floor. We don't know
what there is, we can't
see anything, yet you just blithely
walk off!"



yards away a pillar is rising from the floor. Joan leaps to her feet. "What's that on the platform on top? Isn't it—it is! Food! Look, fruit, bread—and water! A pitcher of water! Come on!" But while she speaks the pillar starts to sink. "Hurry, George!" They run desperately—too late. It sinks back into the floor. They stop, panting, but although George examines the area on hands and knees he cannot discover where it was. "Wonderful engineering," he murmurs, still searching.

"Screw the engineering! I'm hungry and thirsty and that sonofabitch—wait, look! Way over there! Isn't that another one?"

Still on his knees, George looks toward the center of the building, where Joan is pointing. Another black pillar is rising from the floor. George gets up. "Yes. Can you see any—"

"Oh, I'm sure it's got food and water. I'm sure! Let's go!" And Joan dashes off, George pounding after. He is only a step behind her when she hits. "Oww!" She hits hard, falls flat. George cannot stop himself in time, but his outflung arms help cushion the blow. Joan lies on her stomach, head cradled in her arms, crying. George kneels, pats her on the shoulder. "Are you hurt, Joan? Are you hurt, dear?"

"My head, my knee." He gently turns her over—angry, purplish-red splotches on forehead and knee indicate bruises and swelling to come. "You called me dear."

"I did?"

"Yes. When you asked if I was hurt, you said *dear*."

George gently caresses her hair. "Because you are dear to me."

"Thank you for that." She sits up. "I suppose you want to try to get around this—obstruction?"

"I think it would be advisable."

"Well, I don't! This is where I get off the trolley!"

"I beg your pardon?"

"I quit! I'm through jumping through that bastard's hoops. The pillar will sink anyway."

"Not necessarily. Depends on the experiment."

"Screw the experiment. I'm sick of these goddam games."

"I know." George gets up, begins to examine the transparent wall. "If you'd rather stay here—wonder if this came down from above or up from below?" He feels the material, smells it, beats on it, kicks it, breathes on it. "This is incredible stuff! Doesn't feel like glass or

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Poul Anderson, winner of many literary awards and one of science fiction's top writers.



VERTEX INTERVIEWS

POUL ANDERSON

interviewer / Paul Turner

VERTEX: Mr. Anderson, why did you begin writing science fiction?

ANDERSON: Oh, I have been writing as a hobby practically as far back as I can remember, and since I like science fiction, that tended to be what I wrote. Finally, while in college, I got up the nerve to actually submit some of this stuff, and nobody was more surprised than me when it was accepted.

VERTEX: What were the influences which caused you to want to write science fiction?

ANDERSON: I think simply having been a reader of it for years and, by-in-large, enjoying it. And, writing what I, myself, enjoyed. In a way, I suppose as a young boy on the farm, or something like that, I couldn't get enough science fiction, and had to write my own to fulfill a need.

VERTEX: You did go through college and take a technical course. What was that?

ANDERSON: I went to the University of Minnesota with the idea of becoming a physicist or, possibly, an astro-physicist, and took a bachelor's degree in that. But, along about then, I was beginning to realize that probably nature had cut me out to be a writer rather than a scientist. So, except to try and keep up with science, I've never actually used that training. But, it is, of course, helpful in writing fiction, or, for that matter, non-fiction.

VERTEX: What would you say to anyone who wanted to become a science fiction writer? Do you have any advice to those people?

ANDERSON: Well, the first thing I would say is, be well bank-rolled. Although, admittedly, most of my own work has been in science fiction, it hasn't all been, and I don't think this would be a healthy thing. I think one ought to diversify as much as possible. Perhaps I could put it better in general terms,

talking to someone who wants to become a writer, never mind what kind. The late Anthony Boucher said that a contemplated writing career is like a contemplated marriage. If it can possibly be discouraged, it should be, because it's going to have difficulties at best. Of course, there are rather few full-time writers in the field. Most published writers, including even very well known ones, have bread-and-butter jobs. It might be college professorships, or what have you, and, in that case, not being dependant on sales for a living, they are in a less precarious position. In these cases the only advice I could give would be: go ahead and write and don't be too discouraged.

VERTEX: You have been the recipient of a great number of awards during your writing career—many Hugos and The Science Fiction Writers of America award. . . .

ANDERSON: Oh, not a colossal number. At present, four Hugos, one Nebula, and a Cock Robin in the mystery field.

VERTEX: What were your influences? What writers do you feel influenced you most in your writing?

ANDERSON: Well, we would start, I suppose, with the classics. Homer, Shakespeare—the rest of those boys who influence everybody. Getting closer to home, I would say, outside the science fiction field (except to the extent that they wrote it) the two primary influences, would be Rudyard Kipling and a Dane named Johannes V. Jensen. Within the science fiction field, probably Heinlein.

VERTEX: What did Johannes V. Jensen write? I'm not familiar with him.

ANDERSON: Well, as I say about Scandinavian writers, they have the choice between being buried alive in their own language and mutilated in someone else's. But it happens I do know those languages. Jensen wrote on every

"There was talk of the 'new wave' as something revolutionary. Actually it just amounted to the introduction of the more advanced mainstream techniques."

conceivable topic. He was a writer of tremendous sense of style, keen observation, great sense of humor, and tremendous gusto. He obviously enjoyed every moment of his life. For the Anglo-American reader, his best known translated work is *The Long Journey*, which is a science fiction novel of sorts, being about man's progress from before the Ice Age up through the time of Columbus.

VERTEX: While we're on the subject, what are your favorite science fiction authors?

ANDERSON: Oh, I think probably the usual list. In my opinion, far-and-away the best writer in the field, and one of the very best writers in any category is Theodore Sturgeon. Beyond that, I think I would agree with the list of the distinguished practitioners: Heinlein, Asimov, Van Vogt, etc. Then, of course, prominent younger writers too, like Zelazny, and Delany. One of the most incredibly neglected writers in the field has been Gordon Dickson. I do not say this because he is an old friend of mine. I think he's a writer of considerable artistry and considerable depth. Not enough people appreciate this fact.

VERTEX: What stories or novels would you recommend to someone who is starting out in science fiction and wants to read some of the best?

ANDERSON: Well, I think probably the best thing to do would be to go to your friendly neighborhood library. You could look for the classic Conklin anthology, *Adventures in Time and Space*, which was published about 1947 or '48 and contains a vast amount of what many still think of as the very golden age of science fiction. The Science Fiction Writers of America has published a *Hall of Fame* anthology of classic stories, chosen by vote of the members. The volume of short stories has been in print for a year or so, and the volume of novelettes is due very shortly for publication. I think either of those or the various Conklin anthologies, such as you can find in the library, would be very good. That would be for shorter stories, of course. For novels, well, if you wanted to start out with something unusually good you might look for almost anything by Heinlein or the one or two novels Theodore Sturgeon has done. Anything by Fritz Leiber is guaranteed to be good. I mentioned Gordon Dickson. And, of course, one of the most famous ones is

A Canticle for Leibowitz, by Walter Miller. I think starting out on something like that would get this prospective reader pretty well hooked.

VERTEX: While we're on the subject of favorite works, how about your own works? Which works of yours do you like most?

ANDERSON: Well, if I may quote Anthony Boucher again, he said that the least qualified person to judge a writer's work is the writer himself. One does get too personally involved. But, combining personal opinion and reaction that I've gotten from other people, I would say that the two best bets would be rather widely different. One being a pure fantasy novel very thinly disguised as science fiction called *Three Hearts and Three Lions*, and the other a very, very hard core, heavy science fiction novel called, *Tau Zero*.

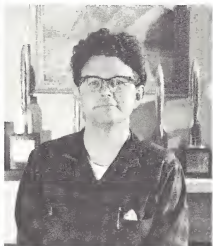
VERTEX: Mr. Anderson, could you tell me how you feel about the progress of science fiction, without too much elaboration, from the beginnings to today's science fiction, and what you envision for the future.

ANDERSON: Do you mean the history of it? Or a judgement of contemporary value?

VERTEX: What do you feel about the development of the quality of it?

ANDERSON: Well, let's see. . . . Of course, science fiction has as many definitions as it has definers, so some people trace it clear back to, Lucian of Samosata. But, I think we can say it's a child of the 19th century. Our roots go back

mainly to Jules Verne and H. G. Wells. Verne as the prototype of the technically oriented—you might say 'hard science'—writer. Wells is the one who was primarily interested in sociology, in what strange developments did to people, and so on. . . . Then, there have always been many practitioners on an occasional basis. I believe I mentioned Kipling as an occasional author of science fiction. Extremely good science fiction. You couldn't better it today. Well, then we get into the pulp era where Hugo Gernsbeck founded the first magazine devoted exclusively to this sort of fiction. And, for a while science fiction was down in the usual pulp clichés; mostly glorified westerns. But, there were a few very good practitioners, even in that era. Stanley Weinbaum comes to mind as one of the most seminal writers the field has ever had. Them, under the editorial influence of John Campbell, a very sharp upswing in quality was seen. Both quality of writing and quality of thinking, so that, for example, the glorified western was no longer acceptable. That was just a lazy way to write science fiction. Campbell had higher standards than that. He developed most of the people who are now the giants in our field: Heinlein, Asimov, Van Vogt, etc. Then, after World War II, under the editorial influences of Anthony Boucher and Horace Gold, there was another very interesting period, an upsurge in purely literary quality. I think this amounted to writers using more and more of the techniques of main-stream fiction. This Second Golden Age—if we call the early Campbell era the First Golden Age; if we call the Boucher-Gold era the Second Golden Age—also slipped into the doldrums. For a while it was a fairly dull field. Then, about ten years ago we got another crop of brilliant new writers. I mentioned Zelazny and Delany as two of them. And a lot of old-timers also caught fire again. There was talk of the 'new wave' as something revolutionary. Actually, that really just amounted to the introduction of advanced mainstream techniques. I think this is a very healthy development. My guess is—I could be dead wrong in this, of course—that science fiction is going to become less and less a distinct field. For quite some time now we have seen highly respectable writers, like John Hersey, writing straight science fiction, which simply isn't labeled as such. It comes out as a mainstream book. And I think more and more of this ghettoization is going to fade away, and, even as science fiction



has been borrowing from the mainstream, so now mainstream is borrowing from science fiction.

VERTEX: Just a short time ago we had the last Apollo flight to the moon, and that changed a great many things in our lives. What do you think about that? How did that affect you as a science fiction writer?

ANDERSON: As a science fiction writer it is hard to say, because everything is grist to a writer's mill. He has to try to keep alive to everything going on in the world, and Apollo, per se, was only one thing among many. I would say I found it a tremendous experience. One of the greatest, and emotionally most important, in my life. I admit to a terrific emotional bias in favor of space flight generally, and manned space flight particularly. My wife and I made some of the flights with journalistic credentials so we could get as close as possible to the actual launching. There is just no experience like one of those. And so it is tremendously saddening to know that we have now seen the last of this sort of thing for a long time to come. It is also maddening, in that we were just beginning to get some pay-off. In speaking to various audiences, including children in poverty area schools, I've had no problem at all convincing them not only of the inherent interest in space exploration, but of the direct value to them. It's easy for them to see. It just seems to be the cocktail party intellectuals who are deaf and blind to these things. Perhaps you have to have a bit of an emotional pre-disposition in favor of something in order to see the arguments in support of it.

VERTEX: When you first began to write science fiction, how acceptable was it to the general public, and how did you feel about that?

ANDERSON: Well, my first story was published in 1947, at which time science fiction still had no academic respectability, except among scientists. I recall with what tremendous delight I saw that the chemistry library at the University of Minnesota, where I was at the time, had begun regularly putting out copies of *astounding Science Fiction*, along with the technical journals. But, scientists and engineers and so on were still considered the rough-necks of academe. Actually, a number of people over in the English Department were reading the stuff too, but they had to keep quiet about it.

Then, as every one knows, gradually it came into more and more respectability as far as the English Departments go, until now I think it would have the status of a fad. Perhaps not an altogether good thing. Leslie Fielder, I believe, who's a science fiction buff himself, has worried about it getting academized to death. But my feeling is, in the first place, the fad will pass, and in the second place, if the literature is fundamentally healthy it will survive this sort of thing.

VERTEX: What kind of discipline do you use in writing your stories? Do you sit down in a closed room and seal yourself off? Just what techniques do you use?

ANDERSON: Well, I should preface this by saying that, over the years, I have met a great many professional writers, I have made a hobby of collecting their working methods, and have never found any two alike. So, what works for me is simply what works for me, and has no universal significance. For me, the writing of a story, particularly a novel, is only the tail end of a rather long process, which began years before with the notation of some idea that occurred, or some fact which might conceivably lead to a story. Jot it down and throw it into the file, and eventually it will coalesce with several others, and there's the possibility of a story. For me it is a long process of planning. Trying to figure just how this story can go. Especially if it's the hard science kind of story I sometimes write. If it to be on an imaginary planet, I want to know exactly what kind of star that planet goes around, what distance; given those two factors, you can calculate how long the year of the planet is, what its mean

temperature is likely to be, and so on. You go on to the biology of life on it, then, if there are intelligent beings, what are they like, and so on, until finally you get down to your individual characters. All of this takes weeks of work, and involves many pages of notes. After that, when it comes to the actual typing, I do get very solitary, and pretty much lock myself up with the typewriter. And I work a pretty long day. I do as many pages of typescript as seems feasible during the day, then spend the evening going over them several times, with a pencil, making corrections. When the first draft is finally done probably no one but me can read it, it's so scribbled over. Then I make a clean copy, making other corrections as they occur to me. I go over this two or three times, to see if there are any further changes to be made, then ship it off.

VERTEX: Sounds like your approach is similar to the systems analysis approach that was developed for the space program.

ANDERSON: I never thought of it that way. It just seemed like the thing to do. When I first started to write, as a young squirt who was only thinking of writing as a temporary way of supporting himself while looking around for something else, I would just dash it out in one draft and put it right in the mail. But I got increasingly less satisfied with this, and, whether it is because I'm getting old or because, I'm getting more careful and meticulous, I find there is increasingly more work per page as the years go by. As for the systems analysis approach... well, I suppose so. In either case, it is a complicated process, and you begin by blocking off the different areas into manageable sizes and working with them individually. For example, developing an imaginary planet in some detail. I also sit down and write biographies of all the important characters.

VERTEX: How do you feel about this, while you're doing your work? What kind of emotions do you experience?


ANDERSON: Mostly I'd rather be out fishing. Well, seriously, it's a lot of work. It's a demanding profession, while you're actually at it. I don't want to sound self-pitying, because it has many advantages too, such as being your own boss, not having to commute, not having to wear a necktie, and so on. But mainly what draws on the nerves is the concen-

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There are times when it is all but impossible to tell who or what a person actually is—especially if you go only by external appearances.

CONFRONTATION

Varney paused in the doorway of the dance hall, peering through the shroud of cigarette smoke.

He threaded his way past the twined couples toward the bandstand, where a young woman watched a pianist fingering "Stardust" out of a battered upright.

He tapped her on the shoulder and she turned with the rapt smile lingering on her lips.

"Elizabeth Peters?"

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fiction / Herman Wrede
artist / Tim Kirk





FUTURE PERFECT

A "perfect" society can tolerate the occasional rebel. But when that rebel attracts supporters, and the supporters become a majority, the very fabric of society is threatened.

fiction / A. E. Van Vogt

Dalkins was the typical rebel, the man-against-society found all through our history, who wanted what he wanted, no matter what the cost.



On the day that Steven Dalkins was eighteen years old, he received an advisory letter from United Governments Life Credit that a million dollar drawing account had been opened in his name. The congratulatory cover note contained the usual admonitions for eighteen-year-olds: gravely explained that the money being made available to him—the million dollars—constituted his anticipated life earnings.

—Spend it carefully; this may be all you will ever receive: that was the summation.

Dalkins was ready. In nine days, beginning on his birthday, he spent \$982,543.81. And he was wracking his brain as to where he could dispose of the other seventeen thousand when a Treasury officer walked into his lavish apartment and arrested him.

Dalkins put out his cigarette in a convenient ashtray—he was surprised to find one in the psychiatrist's office—and then walked to the door the girl had indicated. He entered, and paused with cynical respect, waiting to be noticed.

The man behind the desk was about fifty, gaunt, hair still without gray; and he was busy drawing lines on a chart. Without looking up, he said, "Find yourself a chair."

There were only two chairs to choose from. A hardbacked affair and a comfortable lounge type. With a sigh, Dalkins settled himself into the easy chair.

Without glancing up, Dr. Buhner said, "Wondered if you'd pick that one."

He made another line on the chart. Dalkins watched him despondingly. He was not alarmed. He had come to this interview expecting stereotyped responses. He was prepared for the verdict, whatever it might be. But the trivia was insulting.

He said with that sardonic respect, "You sent for me, Dr. Buhner."

That was an understatement. He had been delivered into this office by the Law. His words received no answer. Dalkins shrugged, and leaned back prepared to wait.

The older man said, "Your reaction to that was quite interesting." He made a line on his chart.

Dalkins glared at the bent head. "Look here," he said angrily, "is this the way you treat human beings?"

"Oh, no." Promptly, "For legal purposes, we define a human being as an unalienated person. We're trying to decide if you're one. If you are alienated, then you are not a human being, by

definition."

Dalkins bristled, then caught himself. Cynically, he quoted, "Have I not hands, organs, dimensions, senses, affections, passions? fed with the same food . . . subject to the same diseases? . . ." He left the phrase unfinished, and waited for a reaction. He felt pleased with himself.

As before, Dr. Buhner spoke without looking up. "Strong word associations." The chart received its inevitable mark.

The older man straightened. For the first time, now, he raised his head. Bright, gray eyes gazed at Dalkins. "I have one question," he said. "Did you have a reason for spending that money within a ten day period?"

The small, scrubbed looking face of the boy sneered at him. "Wouldn't you like to know?" he asked sarcastically.

Dr. Buhner stood up. "Well, I think that does it. I shall recommend that you be fined whatever you purchased except two suits and accessories, and fined the \$17,000 of the balance remaining in your account. This will leave you a few hundred, and you may also keep your apartment. I should advise you that human beings may be sued for, or fined, as much as \$100,000 in any five year period. Alienated persons, of course, lose everything when convicted. In your case, I plan to requisition \$100 each week from the fine, to be paid to you if you show up at my office for therapy. No show, no \$100."

Dalkins laughed derisively. "You'll not see me again," he said, "unless you have me brought here by police action to listen to your phony analysis and stupid judgments."

The psychiatrist stood gazing at him. If there was an expression on his hollow-cheeked face, it was not recognizable. Yet his next words seemed to indicate that Dalkins had penetrated his professional neutrality. He said, almost curdly, "All right, what is in your mind? What do you want?"

Dalkins was at the door, contemptuous. He stood there and he felt in himself a renewal of the greatness feeling that had made him act so decisively. For brief hours after his arrest the feeling had dimmed. There had even been a shadowy agreement in him with all the people who would regard as madness what he had done.

Never would he sink to such a doubt again.

The reaffirmation of his own rightness was in his voice now, as he said, "You had your chance. Next time tell Big Brother to use a man for a man's job.

You muffed it, baby."

"Still," argued Dr. Buhner, who was very happy that this freewheeling dialogue had been triggered while the instruments were still focused and recording. "If I understood it, I could make things easier. I picture you as luxury-loving. No ascetic is Steven Dalkins."

Steven laughed. "I chose that easy chair because you expected me to. I got mad because you thought I would. I consciously fitted into your preconceptions. I don't fit them."

"Everybody fits in somewhere. Man's enduring structure permits only minor variations of personality and even of experience."

Steven shrugged.

Dr. Buhner hastily tried another tack. "What's wrong with every normal person receiving a million dollars on his eighteenth birthday? Everybody else thinks that and a number of similar developments are the Millennium."

"Rumble on, Little Boy," said Steven Dalkins. "But when you're through, let me out of here. You're too late for this conversation. In future I talk only to the big boys."

Without waiting for a reply, Dalkins now opened the door. As he did so, the older man said, "As you leave, pause before the mirror in the anteroom and take a good look at who's talking about little boys."

"Okay, okay," said Dalkins. "So I'm only five feet six. So I don't even look eighteen."

"Maybe fifteen," interjected Buhner.

"In this instance," said Steven, "courage comes in a small package."

Pause, into which Steven projected: "And for your information, I am not an alienated person. And it's you that will have to make the decision to change, and not me."

Buhner smiled like a man who is accustomed to talking to people who think that it is thee not me who is irrational. He said, "If you're not alienated, I don't know who is."

He was talking to a closed door.

When the youth had gone, the psychiatrist sat down in his chair with that faint smile still on his face. He was joined by another man, who silently settled into the chair where Dalkins had sat a few minutes before.

"Well, you heard it all," said Buhner. The other man pursed his rather full lips, and nodded.

"What do you make of it?"

The second man's answer was to stroke his jaw thoughtfully.

"He sounded sincere in the alienated fashion," said the psychiatrist.

Before his visitor could reply, or make a move, the door opened. The girl who had been in the anteroom came in with two copies of a computer print-out. She handed one to each of the men, and went out.

There was a faint rustling of paper as Dr. Buhner and his guest scanned the information on the print-out. The visitor folded his in a deliberate fashion, and for the first time spoke. "His physiologic reactions when you asked him that question," he said in a soft baritone, "establish that he did know about the ten day lag between the time a lot of money is spent and a human being finds out about it."

"The information," was the reply, "is merely classified as Special Knowledge. It is not secret, but simply is not publicized. Tens of thousands of individuals learned of the delay in specific trainings they took."

The second man tapped the print-out, which now lay on his lap. "I notice," he said, "he spent most of the money on the rapid production of a film. Any chance of it being worth anything?"

The gaunt man shook his head. "I had a committee of film people of diverse backgrounds look it over. Their report reinforced my own impression. It's a disjointed piece of junk. Apparently, none of the hastily assembled cast ever saw the whole script. They acted it out in bits and pieces. Clearly, the project was intended to spend the kind of large sum you can put into a film."

The visitor seemed non-plussed. "Have you ever had a case like this before?" he asked, bewildered.

"Once, with the difference that, when we traced down the expenditures, we discovered that he had tried to hide about fifty thousand and had paid another fifty out as a bribe."

"For heaven's sake—" in astonishment—to whom?" When Dr. Buhner smilingly shook his head, the other man apologized. "Of course, the recipient was penalized, and the incident is no longer on his record."

He broke off. "What's your next move with Dalkins?"

"We'll just have to wait and see. He has no hidden money. Therefore, the moment of truth should come rapidly."

"Still—" the visitor was thoughtful—"it says in the print-out that his apartment is paid-up for two months in advance. What's the state of the larder?"

"Lots of food."

"So he can live in total luxury for two

months."

The specialist tapped the print-out. "What bothers me," he said, "is that the computer agrees that he is not an alienated person."

Steven Dalkins came out of Dr. Buhner's office into a gleaming corridor, along that corridor to an elevator, and so down to the ground floor. From there he sallied forth into a world that had not in fifty years changed much in appearance. There were the same buildings, or at least the same types of buildings. Glass, stone, brick and plastic cast into various high-rise configurations. It differed from earlier eras in that it had told him every day in his conscious recollection that it was perfect.

The millenium had arrived. True, the 18-year-old recipient of a million dollars had to work until that sum was paid off. But, then, work was good for people; normal individuals didn't question that.

Most people never succeeded in paying off the debt; they simply didn't earn enough money. But they also, being unalienated, seldom spent all the money.

When an individual died what was left of the million reverted to the state. The work debt, if any, was simultaneously wiped off the books. The children could only inherit a few personal effects; not money or property. There were no loose ends. Everybody started with a clean slate—and one million dollars. Legally, that sum could not be paid twice to anyone, nor could any portion thereof. The law did not provide alleviations for the condition in which Steven found himself. If he worked, his salary would automatically go to pay off his already existing debt.

Apparently unconcerned by any of this, Steven climbed into an electric taxi and was on his way.

In due course, the taxi turned onto the street beside the river and pulled into the driveway of a high-rise apartment building. Steven climbed out into the warm day, paid the driver, and then sauntered to the glittering front entrance. As he did so he was aware of another car pulling to a stop across the road next to the river. The man in it got out and pretended to be interested in the river view.

The spy later reported to Dr. Buhner that "Mr. Dalkins entered the building in which is his apartment, and after two hours has not emerged."

The days went by, and he continued not to emerge.

After a week of nothing, the watchers
A out there, shrugged, and said in

effect, "Well, why don't we just let things happen as they normally would for an eighteen."

Accordingly, there arrived at Dalkins' apartment a notice from Computer-Mate. It informed him that a young woman, Stacy Aikens, age 23, had been selected as a suitable marriage partner for him.

"—As you probably know," the communication concluded, "after a computer selection, both parties have fourteen days to meet and either accept, or not accept, the selected person. If one selectee is willing, and the other not, the willing individual is free and has three more opportunities to accept a marriage partner. On the other hand, the one who refused to accept the computer selectee has only two more chances.

"Dalkins was ready.

In nine days, beginning on his birthday, he spent \$982,543.81. And he was wracking his brain as to where he could dispose of the other seventeen thousand when a Treasury officer walked into his lavish apartment and arrested him."

"When the candidate has used up all three choices, one year must pass before another three opportunities are available. If in private life the candidate meets a potential life partner whose personal qualifications come within the frame of the computer programming for each of them, a marriage may also take place. It should be noticed that in this special situation Stacy Aikens has already waived the requirement that her alter-mate must have money.

"A potential candidate, who does not wish to be married at this time, should so advise Computer-Mate."

Dalkins did nothing. Neither objected, nor asked for his name to be withdrawn. He did not call the girl, and when she finally phoned him on the twelfth day, he informed her that she was acceptable to him."

Appraised of these details, Dr. Buhner had another meeting with the representative of the Treasury department. The man asked, "Do you think he'll marry the woman?"

Buhner smiled. "There we have him. To get his sex organs unlocked, he's got to. Evidently, whatever his plan, that

much is important to him."

"Maybe all he wants is an opportunity to use up her cash."

The grim smile did not leave the psychiatrist's face. "No, we've already limited her withdrawals to exactly double what she has been living on up to now, with extra money available on special request for specific purposes. No, no—" he shook his head—"when biology solved the problem of locking up the male sex organ, and later opening it up so that it could function only with one woman—his wife—the entire course of family relations, and in fact, human history, was altered in a positive fashion. And, of course, since women live an average of seven years longer than men, we naturally set it up so that our youths must marry girls who are four to seven years

older than they are."

He concluded, "My bet is, he shows up for the wedding ceremony."

The sign above the door read: HORMONIC COMPENSATION CENTER and ALTERNATE MARRIAGE REGISTRATION. There was a line-up in front of the door when Dalkins arrived. A group of males stood on one side of a long, narrow fence-like barrier, and a group of women on the other. With one exception, the males were all boys in their late teens and the females were all young women in their early twenties. The exception among the men was an individual of about forty. When Dalkins arrived no woman of corresponding age had shown up among the females, so he assumed that the man was there to spy on him. Dalkins smiled contemptuously.

He took his place at the rear of the male lineup, then glanced over at the women on the other side of the fence. At once he saw Stacy Aikens. The young woman had already seen him, and was gazing eagerly in his direction. Their gazes met. It was the first time they had

seen each other in the flesh; and it occurred to Dalkins that he had better smile. He smiled. She smiled back, revealing rather large teeth.

Stacy left her place in the lineup—she was in third position from her door—and, as required by the rules, came back opposite him in tenth position. The way she walked back toward him indicated that she had very short legs.

Dalkins was not critical of her physical appearance. The new style thinking about such things had been around for more than forty years; and in spite of his antagonism to part of the world around him, that one he had not noticed. The new style thinking required that all normal girls, women, boys, and men be considered beautiful without exception.

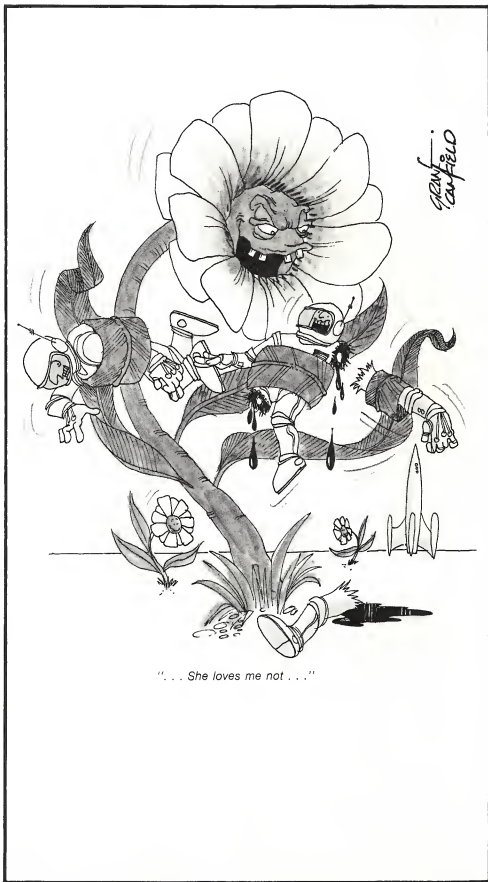
So appearance, in terms of what old style thinking would have called beauty, was not a factor in computer mating. Height was. Weight was. Age was. The young woman who now stood just across the barrier from Steven was 5'1" tall (to his 5'6"), 100½ pounds to his 128, and five years older than he.

All over the world fatties married fatties, thinies thinnies, and intermediates other middlings. And, of course, the ridiculous tendency that men had once had to marry females younger than themselves was nullified by an exact opposite system based on good sense and the findings of bio-chemistry. Sexually, as economically, it was the millenium.

Soon they were inside the building and were seated in adjoining booths, visible to each other and to the boys and young women in other booths through thick, transparent plastic. Since, at Steven's insistence, they had opted for the alternate marriage, they signed a plastic plate with a special type of pen. Their signature was automatically transferred by the computer to the distant department of vital statistics in the state capitol. The signature, of itself, was the marriage ceremony, requiring only the medical recompensation of the male, and the second step of hormonal alignment to make it legal and permanent.

At the computer's request Dalkins unzipped the right hip of his special marriage trousers. Then he leaned back, also by request, and waited while he was strapped in by two mechanical hands. As the "hands" withdrew, a glass-like structure fronted by a needle and a beam of light focused on his exposed thigh just below the hip. The needle moved slowly and entered the flesh. The red fluid visible in the transparent needle disappeared inside him. The needle withdrew.

The computer said, "Hold your arm
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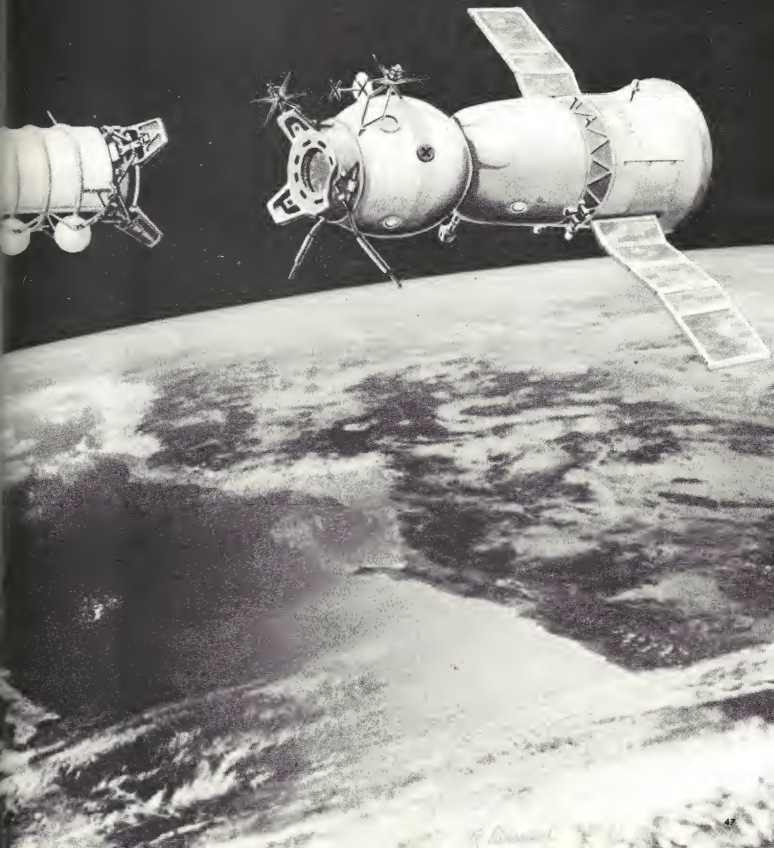




In 1975 the U.S. and Russians will join up in space,
hopefully the first of many cooperative missions.

THE APOLLO/SOYUZ MISSION

by Igor Bohassian





Apollo command astronaut Thomas Stafford and Soviet cosmonaut Andrian Nikolayev inspect the inside of the Soyuz capsule simulator which the U.S. astronauts will use for familiarization while their Russian counterparts study a Apollo simulator.

There has been quite a bit in the news lately about the coming joint U.S./Soviet space flight, something that appears to be a new field, but actually cooperation in space between the U.S. and the Soviets goes back to 1955, the International Geophysical Year. In a series of meetings in 1954 and 1955 U.S. and Russian scientists, as well as those from other nations, sought to develop systems for cooperation in space research and the exchange of space data.

Unfortunately, few of these meetings had any concrete effect, at least until the successful orbital flight of John Glenn in February 1962. With the U.S. in space, with an orbital mission on the books to show that the U.S. was not that far behind the Russians, our government again approached the Soviets with proposals regarding cooperation in space. The then Deputy Administrator of NASA, Dr. Hugh L. Dryden, met with Academician Anatoly A. Blagonravov, and the eventual result was the three-part bilateral space agreement of June 1962.

That agreement provided for coordinated launchings of meteorological satellites and for the exchange of weather data from the satellites over a special Washington-Moscow channel, coordinated satellite mapping of the Earth's magnetic field, and joint communications experiments using the U.S. passive comm-satellite, Echo II.

A second agreement providing for the joint publication of U.S. and Soviet information on space biology and medicine was signed three years later, but, unfortunately, the material was never released.

Then, in October 1970, Dr. Robert Gilruth, Director of the Manned Spacecraft Center at Houston, and Academician Boris Petrov, Chairman of Interkosmos, the Soviet office concerned with international cooperation in space, met and began discussing the possibility of a rendezvous and docking between U.S. and Soviet spacecraft. This led directly to the provisions of the *Space Accord* signed by President Nixon in 1972 regarding the rendezvous and docking mission, presently planned for the latter part of 1975.

Another meeting was requested, and in April 1972 Dr. George M. Low, Deputy Administrator of NASA, Arnold W. Frutkin, Assistant Administrator for International Affairs, and Dr. Glynn Lunney, Special Assistant to the Apollo Program Manager, met with V. A. Kotelnikov, Vice-President of the Soviet Academy of Sciences, Academician B.

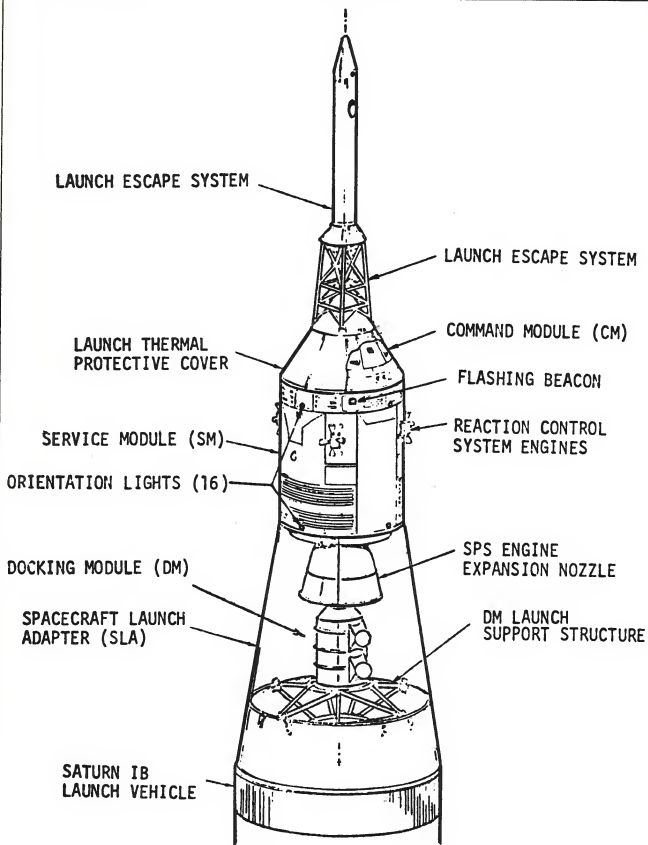
N. Petrov, Dr. I. P. Romyantsev and Dr. K. D. Bushuyev. Following that meeting Dr. Lunney and Dr. Bushuyev were named project managers for the cooperative mission.

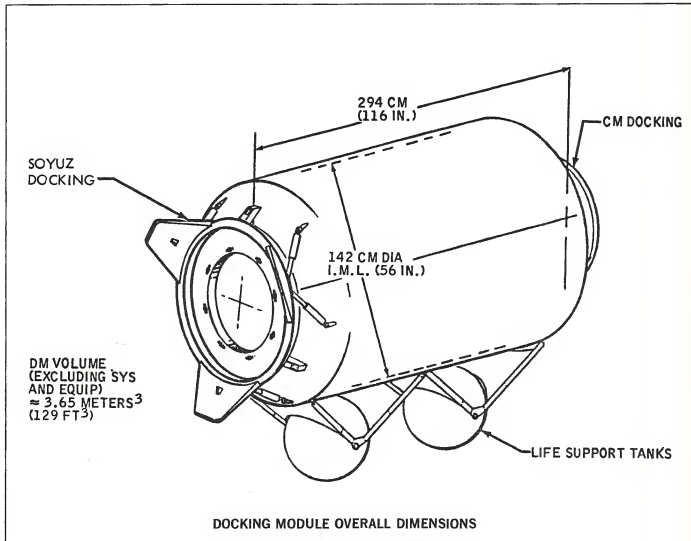
During that 1972 meeting many of the major problems which could have plagued the mission were ironed out. Agreements were reached on such matters as regular and direct contact through frequent telephone and telex communications as well as reciprocal visits, the requirement for and control of detailed formal documentation of the mission, joint reviews of designs and hardware at various stages of development, the requirement for joint tests of interconnecting systems, early participation in the joint preparations by flight operations specialists, the development of crew training plans, and the training in each country of the other country's flight crew and operations personnel.

Agreement was also reached on the principles of communications, command and control of the actual flight, the requirements for flight plans and mission rules for normal and contingency situations, the immediate transmission of in-flight television received in one country to the other's control center, the level of reciprocal language familiarity (which was later to turn out to be a major headache), and the need to develop public information procedures, taking into account the "obligations and practices" of both sides.

Even beyond this ambitious first mission, the accord announced that future generations of spacecraft built by both countries would be capable of docking with each other. This capability will facilitate emergency assistance to astronauts or cosmonauts in difficulty, and will also hopefully make possible the scheduling of cooperative projects, with the attendant savings in dollars and rubles as duplication is eliminated.

One of the first "hard" questions which had to be answered was what vehicles were going to be used? On the U.S. side the answer was fairly simple: the proven and readily available Apollo command and service module which has served so well in the Lunar landing program. The one major change is the addition of the docking module, a cylindrical-shaped structure approximately 1.52 meters in diameter and 3.05 meters long. It will serve as both an airlock for the internal transfer of crewmen between the different atmospheres of the two spacecraft (pure oxygen at 5 psi in the Apollo





The docking module is the one completely new piece of equipment needed for the Apollo-Soyuz mission. One end matches the standard Apollo-Lem docking collar, while the other end conforms to the new U.S./U.S.S.R. standard docking mechanism.

and oxy/nitrogen at 14.7 psi in the Soyuz) and as a stowage area for the new equipment needed for this particular mission. While the Apollo end of the docking module will have the same sort of docking collar the LEM was equipped with for the Lunar missions, the other end will have a new peripheral docking system for mating to the Soyuz. This is the docking system with which all future spacecraft, both Russian and U.S., will be equipped with.

The docking module will also contain equipment for radio communications and TV docking displays, as well as antennas, and the necessary stored gasses, a thermal control loop and the displays and controls necessary for the operation of the module with different pressure levels at each end.

The command module is pretty much a standard Apollo model (how quickly

we get used to the marvelous), with some modifications such as additional propellants, testers for thermal control, and the controls and displays required for the proper operation of the docking module. The actual craft to be used has already been built and checked out and is presently in storage, awaiting a mission.

On the Soviet side there was initially some talk about using their *Salyut* space station as the docking vehicle, but a combination of problems, not the least of which has been the bad luck they have had with the *Salyut* system, led them to choose, as we did, a proven vehicle: the Soyuz spacecraft.

The Soyuz has been the workhorse of the Soviet space fleet since its introduction in 1967, being used for such widely differing missions as solo Earth orbit flights, manned and unmanned rendez-

vous flights, two-man Earth orbit flights, long duration flights (18 days), and as a shuttle vehicle to the Salyut space station.

The spacecraft consists of three distinct modules, the descent module, the orbital module, and the instrument module. The descent module is a pressurized compartment of somewhat conical shape located between the orbital and instrument modules. The crew couches and main control panels are in this module, and the crew remains in this section during launch, reentry, and during certain maneuvers and exercises performed in Earth orbit.

The descent module is connected to the orbital module by an airtight hatch. The orbital module is used as a rest and work area during the Earth orbit part of the mission, and it contains many of the experiment packages carried into orbit. It is approximately spherical in shape, and doubles as an airlock for extravehicular activity.

The instrument module, at the opposite end of the spacecraft, is an unpressurized compartment and contains all the various sub-systems required for power, communications, propulsion, etc.

The exact configuration of the vehicle used in the docking mission will, as with the Apollo, be a modification of the basic Soyuz design. The main modifications will be the construction of the compatible rendezvous and docking system, including radio communications on both U.S. and Soviet frequencies, radio guidance equipment, an optical tracking beacon, the peripheral docking system, docking aids and targets, and the equipment for crew transfer. The basic characteristics of the Soyuz vehicle planned for the test mission are:

Number of crewmen:	2
Weight:	6795 kilograms
Length:	7.32 meters
Diameter:	2.29 meters
Nominal flight:	5 days

One of the first "major" problems to crop up in the planning of the mission was the difference in atmospheres in the two vehicles. The U.S. and U.S.S.R. had taken different paths right from the start of the space age, and there seemed to be no simple way to bring the two back together. The U.S. had opted for the simple (and lightweight) solution of using liquid oxygen, keeping the cabin pressure at only 5 psi. The Russians, on the other hand, taking advantage of the giant boosters (compared to us) they had in the early days, didn't

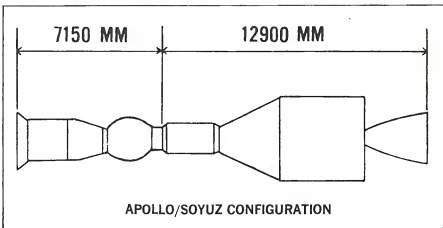
bother eliminating that "useless" 78% or so of nitrogen from the air. One major advantage of this system showed up in a tragic way, when a flash fire in the pure oxygen atmosphere of Apollo 12 as it sat on the pad going through a test took the lives of three U.S. astronauts—a fire that wouldn't have happened in a normal air environment.

The problem confronting the planners of the Apollo/Soyuz mission, though, had nothing to do with fire. Indeed, there was no problem as far as going from the U.S. capsule to the Soviet ship. Just close the airlock door, raise the pressure in the docking module, and exit into the Soyuz. The problem came when trying to go the other way. Under normal pressure some of that nitrogen in the air gets dissolved into the bloodstream. Yes, it's in your blood right now. No problem, as long as you don't reduce the air pressure too quickly. If the pressure drops faster than the nitrogen can escape from

somewhat sluggish. The key words there are *might* and *somewhat*. After months of wrestling with the problem the Russians, specifically Dr. Bushuyev, surprised everyone by offering to drop the pressure in the Soyuz from 14.7 psi to 10 psi, which cut the waiting period to practically nothing.

On January 30 of this year another milestone in the Apollo/Soyuz mission plan was reached, when NASA announced the crew for the U.S. half of the mission. Named as prime crewmen for the flight were Brigadier General Thomas P. Stafford, mission commander, Vance D. Brand, command module pilot, and Donald K. Slayton, docking module pilot. The backup crewmen are Alan L. Bean, Ronald E. Evans and Jack R. Lousma.

Stafford, 42, is an Air Force General and one of NASA's most experienced and senior astronauts. Since his selection



the bloodstream, such as when coming up from a deep dive in the ocean, or going from the 14.7 psi pressure in a Soyuz to the 5 psi pressure in an Apollo, the nitrogen forms bubbles, and the bubbles give you the "bends," a quite painful and sometimes fatal ailment.

One way to cure this is to drop the pressure in the docking module slowly, but, at a safe speed, it would take some 2½ hours to move from the Soyuz to the Apollo, which would put a definite limit on the number of trips which could be made back and forth.

The solution to the problem was simple, but it's a small miracle they were able to work it out. Neither side was about to admit that their system was inferior, raising the oxygen pressure in the Apollo would make the astronauts drunk, and lowering the pressure in the Soyuz might make the cosmonauts

by NASA in September 1962 to join the Astronaut Corps he has logged 290 hours and 15 minutes in space on two Earth orbital flights and one Lunar orbital mission—Gemini 6, Gemini 9 and Apollo 10. He has served as Chief of the Astronaut Office and since June 1971 has been Deputy Director of Flight Crew Operations. He is a native of Weatherford, Oklahoma.

Brand, 41, is a civilian and is the backup commander for the second and third manned Skylab missions scheduled to be flown this year. Selected as an astronaut in April 1966, he served as a crew member for the thermal vacuum testing of the prototype Apollo command module and was an astronaut support crewman for the Apollo 8 and 13 missions. He was backup command module pilot for Apollo 15, and he has

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You thought that black thingie was some sort of teaching device/signalling device/transportation device, didn't you? Boy, do we have news for you!

2000 1/2 A SPACED ODDITY

fiction/F. M. Busby

A tribe of savage apes dances to the background strains of "The Red River Valley." Others approach, shrieking, jumping up-and-down; it may be that they do not like "Red River Valley." The two groups scream and make faces until the number comes to an end; then they separate and go in search of the modest evening repast: grubs under rocks. The first tribe finds more. Replete, it seeks a shallow cave under a cliff, for shelter through the night.

It is dark. The little clan awakes, startled by a strange sound and a flash of light. The young are frightened; at first they cry, but soon quiet, for the Old Man of the tribe reassures them. He shakes a fist and reassures them that he is much more to be feared than any strange sound or flash of light.

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THE EXPERIMENT

from page 33

plastic. And why doesn't my breath condense on it?"

"You asking me? I don't even know why your breath condenses when it does condense."

George walks along the invisible wall, touching as he goes.

"You—you're going?"

"I have to, Joan. I'll do my best to get back."

Joan gets to her feet, gingerly rubbing her forehead. "Never mind. I'm not staying here alone." She follows him, running her hand along the invisible barrier. "Let's see what's being walled in or out here, as Robert Frost would say."

"Sure you're all right?"

"Oh, I'll live. I hope," she adds in a whisper.

"You feel low and I'll feel high," he says, "I wouldn't want to miss an opening."

"I wouldn't want you to."

They walk the perimeter of their new cell. George calculates it to be a rectangle, about 75 by 100 yards, one side bounded by the hemisphere's wall. There is no opening. "All right," says George, "next step. Lean against the wall, and I'll boost you up the way we did before."

"I hate this," Joan says as she steps into his interlaced hands.

"Up you go!"

"Whoa!" she cries, "here's the ceiling." She feels along it. "Same stuff as the walls. Kind of curved here where it joins the wall." She reaches out as far as she can. "No opening."

"Ceiling's about 10 feet high," George says as she lowers her to the floor.

"OK—spread your legs."

"George, for—"

"I want to hoist you up on my shoulders, there's got to be an opening in that ceiling."

There is. It takes them about ten minutes to find it. George boosts Joan through, then leaps up, catches an edge of the circular opening, and pulls himself through. This compartment is smaller, and the second opening is fairly easy to find, being waist high in one of the walls.

So they move through the invisible, three-dimensional maze, approaching the pillar slowly and roundaboutly, sometimes as high as a hundred yards above the floor, sometimes running into a dead end which sends them back to find a different opening in a preceding compartment. It is hot; their bodies are soon slick with sweat and frazzled with exhaustion. They get close enough to see the fruit, bread, and water on top of the

pillar, but the last three compartments are particularly tortuous. They wearily push on until only one wall seems to separate them from their goal. At last they find a small, square opening, close to the floor. "Can you make it?" Joan asks.

"I think so, but you go first—here, quick"—he helps her through—"before it sinks again."

Joan wriggles through and streaks for the pillar. George keeps an anxious eye on it as he squeezes his shoulders through the opening, but it doesn't move. Apparently the Keeper is going to let them have their reward. George forces his body through just as Joan arrives at the pillar. He is rising toward her as she reaches up for the water container. She raises it to her lips, then holds it away from her, touches the material inside, and hurls it to the floor. Then, shouting incoherently, she flings the loaf of "bread" to the floor and is throwing "fruit" at the transparent walls as George comes panting up and grabs her arms. "Wait, please, wait! Joan!"

But Joan's rage turns into screaming hysteria—her body alternately curls up and extends rigidly—it takes all his strength to hold her. At last her emotion can drive her overstrained body no further, and it goes limp, and her screams turn to sobs, and George lowers her to the floor. He kneels beside her, reaches out for the water and bread. Hard. Light in weight. Some kind of plastic or glass fiber, almost perfectly resembling the real material. He touches an "apple" and a "pear." Same. He knows he should investigate further, but he feels very tired. Joan whimpers, curls up in a fetal position. George lies down behind her, fits her body into his. She pillows her head on his left arm, and after a long time, stops crying.

George gently withdraws his arm and sits up to stretch his muscles. "Oh, hell," he says.

"What?"

"Another one."

"Another what?" Joan sits up, looks where he is pointing. "Oh, another pillar." She laughs shortly, lies back down.

"Apparently the experiment isn't over yet," George says.

"It is for me—my mouth is so dry I can't spit, my head hurts, my knee hurts, I'm just tucked out—I couldn't get over there if I wanted to, and I don't want to, because that water is plastic."

"I suppose it is."

"You know it is. He's just pushing us, seeing how far we'll go. I'm not going any farther."

George looks once again at the pillar, then lies down on his back, hands behind his head. "So we'll just—wait?"

"If you want to try it, go ahead."

"I don't want to leave you."

"You can leave me. I'm resigned now. If you want to try it, go ahead."

"I don't want to leave you."

"You can leave me. I'm resigned now. If you want to go, go."

"No, I'll stay."

Joan snuggles up to him. "I think you're wonderful."

"Yeah, it's sure wonderful the way I'm getting us out of here."

"That isn't your fault! You can't fight this, this—it makes you wonder if that sonofabitch is human even."

There is a long silence. Finally George says, "That thought has crossed my mind. In the absence of data I suppose you can make any guess you want."

Joan kisses him. "That's my computer talking! You're the—Hey! Aren't we—we are! We're moving! Down—the floor!"

"Joan! I can't—move—arms—legs—"

"Oh Jesus Christ I can't either!" The section of floor continues to descend. George exerts all his strength, but can not lift a limb. Only his head, cradled on his folded arms, is free. He twists it to and fro. They are descending swiftly; the only light visible is the square above them. "God, oh God, oh God," whispers Joan.

They stop. Darkness. A humming sound. Then, gradually increasing illumination. Their slab rests about five feet above the floor of a small, square room, empty except for a number of mechanical arms bristling from the walls. The arms are extensible, retractable, extremely maneuverable, and they move in a weird ballet over the slab. Some of the arms terminate in 6-finger-2 thumb "hands," others merely have a cylindrical ending. The terminators range in size from about six inches to less than one inch across.

Four large arms now descend purposefully to George's body and mechanical hands arrange him on his back, with legs apart, arms just slightly out from his sides, palms facing upward. The force holding George to the slab is turned off for this action, and he fights to escape. "What are they doing?" Joan asks.

"I don't know," George grunts—"preparing us."

"For what?" she cries.

George's struggles are in vain; his muscles are no match for the arms which casually manipulate him. When his body is positioned, the holding force is reacti-

vated under him and the arms begin to arrange Joan.

Now she struggles—uselessly. “Oh, God, they handle us like animals”—her voice rises to a near-scream—“we’re human, you hear, *human!*”

Now one mechanical hand and one cylindrical terminator approach each head. The cylinders click, blades flick out. Joan screams, then moans as the blade descends. But the machines merely shave them. Heads first, then George’s face and chest, then the pubic hair of both. No lather is used, but the blade is so sharp, and the machines’ touch so delicate, that there is no pain.

There is only fear.

When the shaving is completed, the “razors” retract, small nozzles click out, and jets of air clear the bodies and the slab of hair. neither George nor Joan can take their eyes off the cylinder as the nozzles retract and the equipment whirs gently. What will come out next? In some part of their psyches both already know, but still they watch, virtually hypnotized, as the scalpels emerge.

“Is—is it an operation?” Joan asks. Two other arms extend over each human, holding taut the skin of the abdomen. The scalpels position themselves. “Is it an *operation*, George? Why don’t they have some anesthetic? Give us some anesthetic you bastard! Oh you filthy murdering basta-a-a-iii!”

George’s scream of agony blends with Joan’s as the scalpels make their inverted T-shaped incisions—one horizontally across the lower abdomen about two inches above the pubis, and the vertical one beginning at the upper diaphragm and slicing through the navel to intersect the first cut at a perfect right angle. Mechanical hands lift skin and muscle as intestines spill out of the incisions. Other arms move in. Small scalpels and forceps and syringes click out, and trays of various sized containers appear through openings in the wall. Mechanical arms methodically cut, probe, take samples. A tool resembling a fine golden wire cuts off the top of Joan’s skull. Electrodes are inserted, moved, inserted again. Joan dies. The electrodes click back into their cylinders, and tiny scalpels cut out slices of Joan’s brain as others take samples of her stomach, liver, pancreas, spleen, and large and small intestines. One of her ovaries and her uterus are cut out and preserved. One of George’s kidneys is cut away and bottled. One of his testicles is removed. George dies. Samples of his muscle, fat, and nerve tissue are taken. His thoracic cavity is exposed; a wire tool slices

through his ribs and scalpels begin cutting into his lungs and heart. Samples of bronchial tubes and lungs, of large and small veins and arteries are taken. His heart is put into a bottle. George’s skull is opened. Scalpels and mechanical hands range freely over both bodies: arms are dissected, a humerus is cut in two, bone and marrow samples are taken. Throats are slit, samples taken of tongue and larynx and esophagus. Then the bodies are turned over, backs of skulls removed. Samples are taken of Joan’s lower brain, but George’s brain and spinal cord are lifted out in toto and placed in a large container. One knife exposes George’s back muscles, another slices into Joan’s buttocks, dripping scalpels and mechanical fingers open the backs of thighs and calves. Finally feet are dissected, a toenail is ripped out and put into a test tube, and the sample racks disappear into the room’s walls. Hoses extend themselves from the wall and shoot steam and hot water onto the mechanical arms and hands and tools, washing off blood and bits of flesh. Clean, the arms retract. The slab lowers to floor level. A door opens, water pressure increases, and amid the hiss of steam and whoosh of water, George and Joan are washed out of the room.

The water is cut off, the hoses retract. The empty slab rises to the hemisphere above, the lights dim, and the dissecting room, in darkness, waits. ○

“When you’re put in a prison you try to get out. But my question is, why were we put here, naked, with our memories partly gone?”







*How can a man who is blind
appreciate a rainbow?
How can a people who live in
sequential time understand
a man who does not?*

Weed of Time

fiction / Norman Spinrad

“... knowledge of the future is useless . . .
the future cannot be changed because it was not changed
because it will not be changed.”

I me, the spark of mind that is my consciousness, dwells in a locus that is neither place nor time. The objective duration of my lifespan is one hundred and ten years, but from my own locus of consciousness, I am immortal—my awareness of my own awareness can never cease to be. I am an infant am a child am a youth am an old, old man dying on clean white sheets. I am all these mes, have always been all these mes will always be all these mes in the place where my mind dwells in an eternal moment divorced from time. . . .

A century and a tenth is my eternity. My life is like a biography in a book; immutable, invariant, fixed in length, limitless in duration. On April 3, 2040, I am born. On December 2, 2150, I die. The events in between take place in a single instant. Say that I range up and down them at will, experiencing each of them again and again and again eternally. Even this is not really true; I experience all moments in my century and a tenth simultaneously, once and forever. . . . How can I tell my story? How can I make you understand? The language we have in common is based on concepts of time which we do not share.

For me, time as you think of it does not exist. I do not move from moment to moment sequentially like a blind man groping his way down a tunnel. I am at all points in the tunnel simultaneously, and my eyes are open wide. Time is to me, in a sense, what space is to you, a field over which I move in more directions than one.

How can I tell you? How can I make you understand? We are, all of us, men born of women, but in a way you have less in common with me than you do with an ape or an amoeba. Yet I *must* tell you, somehow. It is too late for me, will be too late, has been too late. I am trapped in this eternal hell and I can never escape, not even into death. My life is immutable, invariant, for I have eaten of Temp, the Weed of Time. But you must not! You must listen! You must understand! Shun the Weed of Time! I must try to tell you in my own way. It is pointless to try to start at the beginning. There is no beginning. There is no end. Only significant time-loci. Let me describe these loci. Perhaps I can make you understand. . . .

September 8, 2050. I am ten years old. I am in the office of Dr. Phipps, who is the Director of the mental hospital in which I have been for the past eight years. On June 12, 2053, they will finally

understand that I am not insane. It is all they will understand, but it will be enough for them to release me. But on September 8, 2050, I am in a mental hospital.

September 8, 2050 is the day the first expedition returns from Tau Ceti. The arrival is to be televised, and that is why I am in Dr. Phipps' office watching television with the Director. The Tau Ceti expedition is the reason I am in the hospital. I have been babbling about it for the previous ten years. I have been demanding that the ship be quarantined, that the plant samples it will bring back be destroyed, not allowed to grow in the soil of Earth. For most of my life this has been regarded as an obvious symptom of schizophrenia—after all, before July 12, 2048, the ship has not left for Tau Ceti, and until today it has not returned.

But on September 8, 2050, they wonder. This is the day I have been babbling about since I emerged from my mother's womb and now it is happening. So now I am alone with Dr. Phipps as the image of the ship on the television set lands on the image of a wide concrete apron. . . .

"Make them understand!" I shout, knowing that it is futile. "Stop them, Dr. Phipps, stop them!"

Dr. Phipps stares at me uneasily. His small blue eyes show a mixture of pity, confusion and fright. He is all too familiar with my case. Sharing his desktop with the portable television set is a heavy oaktag folder filled with my case history, filled with hundreds of therapy session records. In each of these records, this day is mentioned: September 8, 2050. I have repeated the same story over and over and over again. The ship will leave for Tau Ceti on July 12, 2048. It will return on September 8, 2050. The expedition will report that Tau Ceti has twelve planets. . . . The fifth alone is Earthlike and bears plant and animal life. . . . The expedition will bring back samples and seeds of a small Cetan plant with broad green leaves and small purple flowers. . . . The plant will be named *tempis ceti*. . . . It will become known as Temp. . . . Before the properties of the plant are fully understood, seeds will somehow become scattered and Temp will flourish in the soil of Earth. . . . Somewhere, somehow, people will begin to eat the leaves of the Temp plant. They will become changed. They will babble of the future, and they will be considered mad—until the future events of which they speak begin to come to pass. . . .

Then the plant will be outlawed as a dangerous narcotic. Eating Temp will become a crime. . . . But, as with all forbidden fruit, Temp will continue to be eaten. . . . And finally, Temp addicts will become the most sought-after criminals in the world. The governments of the Earth will attempt to milk the secrets of the future from their tortured minds. . . .

All this is in my case history, with which Dr. Phipps is familiar. For eight years, this has been considered only a remarkably consistent psychotic delusion.

But now it is September 8, 2050. As I have predicted, the ship has returned from Tau Ceti. Dr. Phipps stares at me woodenly as the gangplank is erected and the crew begins to debark. I can see his jaw tense as the reporters gather around the Captain, a tall, lean man carrying a small sack.

The Captain shakes his head in confusion as the reporters besiege him. "Let me make a short statement first," he says crisply. "Save wear and tear on all of us."

The Captain's thin, hard, pale face fills the television screen. "The expedition is a success," he says. "The Tau Ceti system was found to have twelve planets, and the fifth is Earthlike and bears plant and simple animal life. Very peculiar animal life. . . ."

"What do you mean, peculiar?" a reporter shouts.

The Captain frowns and shrugs his wide shoulders. "Well, for one thing, they all seem to be herbivores and they seem to live off one species of plant which dominates the planetary flora. No predators. And it's not hard to see why. I don't quite know how to explain this, but all the critters seem to know what the other animals will do before they do it. And what we were going to do, too. We had one hell of a time taking specimens. We think it has something to do with the plant. Does something strange to their time sense."

"What makes you say that?" a reporter asks.

"Well, we fed some of the stuff to our lab animals. Same thing seemed to happen. It became virtually impossible to lay a hand on 'em. They seemed to be living a moment in the future, or something. That's why Dr. Lominov has called the plant *tempis ceti*."

"What's this tempis look like?" a reporter says.

"Well, it's sort of. . . ." the Captain
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ADAMANT EVE



*"Do you think I was born yesterday?
I know my rights, and I won't stand by
for any snake brutality!"*

I am not," the naked blonde girl with the saucer eyes declared firmly, "going to eat that apple. Apples give me a rash, and I don't care much for them anyway. You're not going to get me to take even one tiny bite out of it, no matter what awful things you do to me."

The snake had decided what he'd like to do to her. Specifically, he wanted to tear her limb from limb, and in general to remove all her working parts and return them to the transformation machine in the space rocket. Unfortunately, there was no time to start over.

"I'm losing my patience," he warned her. "You're going to eat this apple, and you're going to eat it *now*!"

The girl shook her fuzzy mop of hair. "In this scheming dog-eat-dog world, thank heaven there's still room for the little person with ambition and the gumption to stand up for her rights."

The snake hissed a wistful sigh. His longing gaze fell once again on the distant star twinkling faintly just above the planet's horizon. His dwelling on that star was only a hole in the ground, but he called it home, and he wished fervently that he were there drowsing in the noonday sun instead of on this strange, desolate, alien, unfriendly world with this female humanoid who refused to cooperate.

The plan of the scientific expedition was to seed unpopulated worlds with different life forms, but this particular planet seemed to be going to seed on the first day.

Hopefully, the snake nudged the red luminescent fruit toward the girl—whom, out of a sense of tradition, he had named Eve. Disdainfully, Eve pushed it away.

"I don't *have* to if I don't *want* to. And I don't *want* to," she told him with a brazen flounce of her curly golden head. "Do you think I was born yesterday? I know my rights, and I won't stand for any snake brutality!"

"You were born this morning," the snake reminded her. "Besides, what's this about rights and brutality? All I'm asking is that you take one little bitty bite out of this nice, juicy, shiny, delicious apple. Is that a fate worse than death?"

"For all I know, the apple might be



***"The girl grabbed the snake
and shoved the apple into its mouth.
The snake coughed, gasped,
sputtered, chomped and finally,
gulped!"***

drugged, and when I'm unconscious and unable to protect myself, you'll take all sorts of terrible liberties with my lush young female body."

Gritting his fangs, the snake said, "It's got a nice-tasting aphrodisiac in it, that's all."

The girl sniffed suspiciously. "An aphrodisiac? What's that?"

"It's a--well, it's a kind of vitamin."

She smirked. "I'll bet."

"Would I lie to you?"

"Beats me. I don't even know what a nice girl like me is doing in a place like this."

Frantically, the snake shotgunned imploring glances elsewhere, but of course there was no one in sight except Adam, and that clod was dozing under a palm tree at the end of the garden beyond the snake's rocket, without a care or a worry in the world.

The snake tried another approach. He whispered, "Listen. You take one bite out of this apple, and Adam will chase you all over the garden and out the front gate."

The girl favored him with a thoughtful frown. "Why would he want to do that?"

"Because he's naked," the snake explained, "and because you're naked, and--"

The frown grew deeper, creasing the ordinarily smooth forehead above the saucer eyes. "What's *naked*?"

The snake cleared his throat, gathered his thoughts, and prepared to launch into the standard briefing on humanoid biology.

"If this is exposed--"

"Ooooooooooooooh!"

"--and this--"

"Mmmmmmm."

"--and this--"

"Wow!"

"--it means you're naked."

"Hey, that felt pretty good. Do it again."

The snake's eyes glittered with renewed hope. "Okay--if you'll take a bite out of the apple."

"Sure," she agreed, "but *you* first!"

The girl grabbed the struggling, protesting snake and shoved the apple into its mouth. The snake coughed, gasped, sputtered, chomped and gulped. The fruit slid queasily into his stomach, exploding with a warmth that made his

scales glow.

A promise, Eve told herself, was a promise—even to a snake. She had to admit the apple didn't taste bad at all, but she had hardly time enough to chew and swallow just a little piece before the snake was chasing her all over the garden, past the dozing Adam, and out the front gate.

The snake skidded to a halt when he realized where he was. Turning, he hurled himself at the gate, trying to return to the garden where his spaceship lay ready to carry him home.

But the force shield he had thoughtfully constructed hurled him right back.

Coiling on the cold ground, he cried snake tears of genuine misery.

"I failed," he wailed.

The girl grunted. "Big deal. A person's got to make his way in this land of opportunity and not depend upon the sympathy of others. See you around, snake-eyes."

As the snake pondered this bit of philosophy, he watched the naked blonde girl swivel-hip over a nearby hill. Another movement from within the garden caught his attention, and he turned to see Adam wandering into his spaceship. A moment later, the humanoid accidentally touched controls which whooshed him into outer space and away from the planet forever.

A moment before the glow of the rocket's red glare vanished, parachutes blossomed and floated downward as excess weight was jettisoned to lift the craft into inter-stellar orbit. The snake knew there would be things he could use among the jetsam, but sadly, nothing that would take him from this planet and the female he had created.

He found Eve kneeling in the sand beside a crystal clear stream of cool water, primping her shaggy hair in front of the reflected image.

Resigned to his fate, the snake blurted it out. "Eve, will you marry me?"

She shook her head. "I can't. I don't have a thing to wear. Besides, I'm too young to get married. I want to have fun first."

"Fun? Fun with whom? You and I are the only persons on this planet!"

"Well, not with *you*. I may be hard

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Black Hole Mines In The Asteroid Belt

article / Jerry Pournelle

Cosmologists haven't known about Black Holes very long, but they've become fascinated with them; there are even a few theorists who think half the matter in the universe may be in Black Holes. As we'll see, there's even some evidence to show that we're all inside a Black Hole in somebody else's universe.

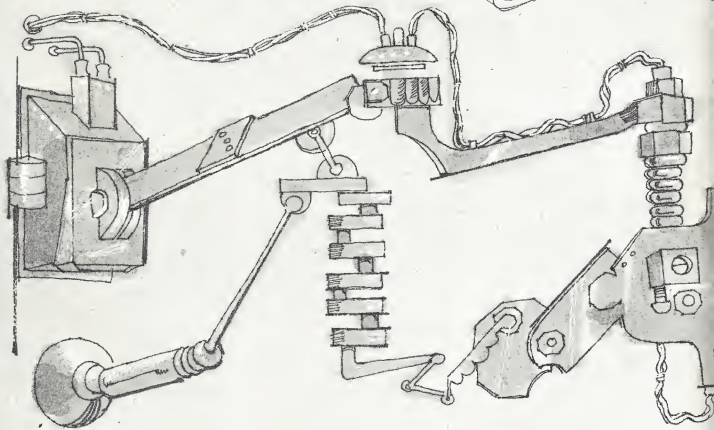
The "classical" or Schwarzschild Black Hole—it seems silly to speak of something dreamed up only a few years ago as "classical," but Black Hole theory changes so fast that it's appropriate—is formed by the collapse of a star. Beginning at about five stellar masses, the star finally runs out of fuel for keeping its thermonuclear reactions going. It goes out.

Light pressure ceases. There's nothing to hold the stellar stuff out, and there's a lot of mass at the center. Gravity takes over, and the star collapses. It generates a lot of energy and radiates away perhaps as much as four-fifths of its mass, but it goes right on collapsing.

If the gravitational field gets intense enough, the atomic shells collapse also. The electrons are pushed in, leaving nothing but nuclei. Since the electrons which are forced into the nucleus react to make neutrons, the result is called a neutron star. The whole thing is about a dozen kilometers across: but it's visible.

Neutron stars are only half-way things, though. They may be stable, but if the gravitational field was intense enough the process goes all the way.

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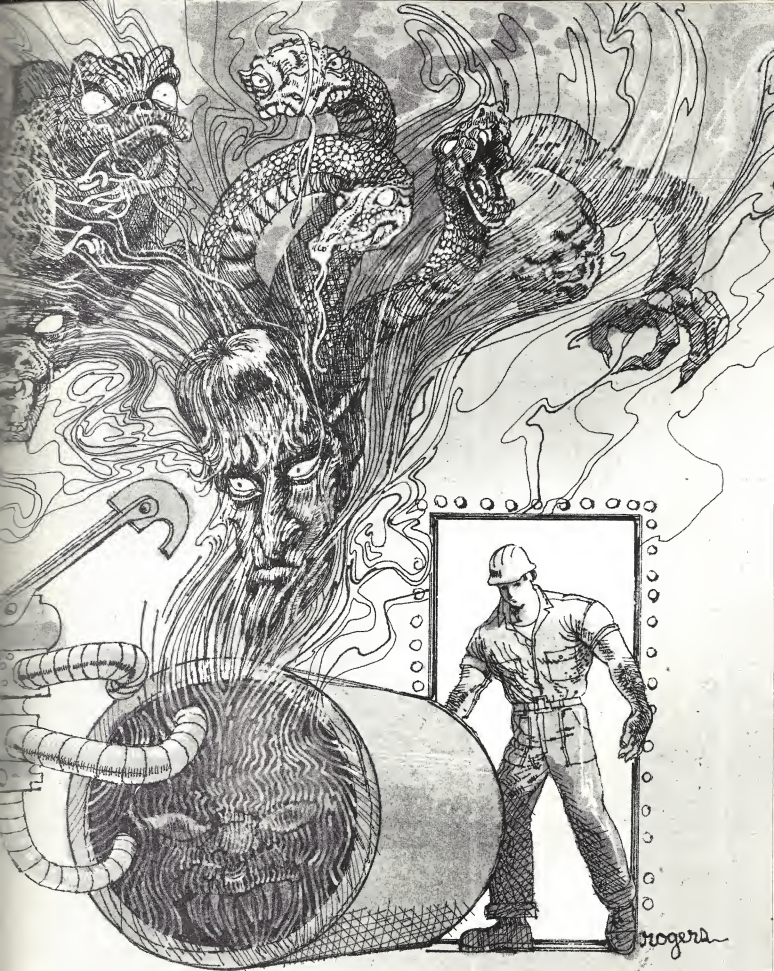


*Does survival of the fittest
mean that those who cannot adapt to our
technological society must die?*

BRAVE ARMS, STRONG ARMS

fiction / Greg Joy

artist / Monte Rogers



Atomic Age garbidge-men, Boss Joe Harkins calls us. He 'n' I load the radio-active junk in cansters from the reactors into a grey VW panel truck with red radiation signs all over it, an' Joe drives it down to the fish-stinkin' docks. I can't drive 'cause I can't read. Stupid, huh? I drive real good, when nobody's watchin'. We unload the stuff and put it on a Navy ship, usually one of them destroyers named after states, with a rack o' depth charges in the back that look like our cansters and sometimes with some o' them big, fast-lookin' rockets on board, all ready to blast the Russkies or Chinks, Mebbe both. They take our junk way the hell out in the ocean and dump it. Seems stupid to me. I don't see how a hunk of fancy coal can hurt you.

Look at that rumdum Joe over there on the dock, gruntin' like a pig in heat as he lugs the last can to the truck. Hell, I've pressed more than that one-handed. Joe's lats aren't big enough for the job . . . he oughta work out every day, like me. I've hauled twice as many cansters today as him.

He heaves the can in through the big side doors, and the truck rocks a little. Sweat cryin' off his face, he pushes the canster across the floor with a squeaky sound like fingernails pulled over a blackboard as some little rocks is caught under it. The can finally drops into a hole built into the floor to keep it from slidin' around and tippin' over. Wipin' his face with one of them stupid lace hankies his old lady gives him, he turns to me and says:

"Go into the building," he says, "and ask Doctor Lee if this is all. There's fewer cans than usual." As I open the door and climb out the front seat, he comes in through the side door and sets down to rest. As I walk away, he props up his crossed legs on one o' the cansters and takes out that ugly-smellin' pipe. He lights up, suckin' on the stem like his mother's tit. He'll never build up his lats if he doesn't stop smokin'.

The wood dock makes a nice thunkin' sound to my boots, the only thing about this glass an' metal place that reminds me of home, our farm. I push through a swingin' door with a sign on it that Joe told me says "Authorized Personnel Only." I must be a authorized personnel now! I look around, but don't see nobody. The place smells like a hospital, but there's the sound of big ma-

chines grumblin' to each other. I bet machines bitch about what they have to do, too. They hiss and crackle when they're mad, and hum when they're happy.

They're hiss'n and spittin' at me now, and they're watchin' me through all them dials on the wall to my left. I don't like this place . . . I feel like pullin' all them levers and switchin' all them dials to OFF. All they've left for me to do is pick up their shit 'n' take it away.

I walk past a big doughnut-shaped machine covered with wires like a spaghetti-makers nightmare, and spot a door with some writin' on it, "D-r.-L-e-e" it says. I know that "D-r." spells doctor, but how can "L-e-e" be Lee? Lee is a *shorter* word than doctor.

I open the door anyway, and here's a pale, skinny runt with his back to me. His arms is in some kinda contraption as he stares into a little window in the wall. He must be a doctor, 'cause he's got a white coat hangin' on one o' the levers next to the window, just like the people at the hospital. He don't wear glasses, though.

"You Dr. Lee?" I says, and he turns around and gives me a fish-eyed look.

"Yes, who are you? What are you doing here?" He talks out of the side of his mouth, like a fly with the zipper half open.

"Joe says to ask you if they's any more radio-active cansters to take out," I says.

"No, they were all on the loading-dock," he says, turning back and looking in the window again. "You can leave now," he says. I turn to go, but then I look at him and stare. What the Hell is that guy tryin' to do? He's wavin' his arms and openin' and closin' his fingers, grabbin' at nothin' . . . thin air!

"Whatcha doin', Doc?" I asks him, as I move to his side. He looks at me and smiles. He must like to explain things to dumbbells like me . . . all doctors do.

"These are pantographic arms," he says, noddin' his pointy chin at the metal bars runnin' along his arms, and up to a socket in the ceiling. I look at 'em close.

The bars is bent at the same place as his wrist, elbow and arm joints. Each finger has a small bar above it runnin' to the big bar, and rings around the fingers and arms holds the shiny brushed-metal arm to the doc's own skinny arm. He has more rings and bracelets than a fat Sultan I once saw in a Sinbad flick.

"Look in there," says the Doc, flickin'

his eyes at the window like James Bond. I look in, and see another pair of metal arms just like the ones out here. "When I move my arm," he says as he waves his right arm, "and wiggle my fingers," he says as he makes like a drunk piano player, "the arm in the other room does the same." And it does just that, and the dog grins at me. His breath stinks of hamburger with onions and white bread, and there's still white crud between his teeth. No wonder he's so sickly.

"Why d'ya need that, Doc?" I says to him. But I already knew the answer . . . it was so some skinny bastid can take over a *real* man's job.

"It isn't safe to go in there," he says, "because of the invisible but deadly gamma rays." Haw! Sounds like the bogeyman Pa used to warn me about. Pa couldn't fool me, though. One day I heard him arguin' with Mom. She said they should try to explain things to me, but Pa said I couldn't understand, an' it was better to scare me with a bogeyman than take a chance on me hurtin' myself. I'm fed up to *here* with other people's hobgoblins.

"How do you open this thing up?" I says to him, walkin' over to the door to the other room like it's nobody's business. It's all covered with dials with twitchin' needles like the tach on my Pa's old '52 GMC pickup, and there's a steerin' wheel in the middle.

"You turn—" he starts to say, then stops when he knows what I'm gonna do. "No, don't!" he says to me, and his eyes bug out like them leopard frogs I used to catch in the cattle-pond on our farm. Man, is that cat scared! I know what to do now, though, and I grab the wheel. It's got a smooth, metal feel, and it turns real easy.

The doc is goin' wild. He tries to reach me, but he forgets he's still hooked up to the metal arms, and he can't. I hear somethin' heavy fall over with a thud in the next room, and I look through the little window in the door. It's one o' them cansters with the lid off, rollin' across the floor. The doc reaches over and flips a switch, shuttin' off the arms, but not before I hear 'em knock over somethin' else with a sound of breakin' glass.

I turn the wheel five times, until it won't turn any more, and pull. The door don't open.

The doc yanks and pulls at the arms till he's free, and the next thing I know

he's got his clammy, bony little hands on my arm, tryin' to pull me away. I harden my arm muscles and break his grip. He can't even put his hands all the way around my arm, and he wants to try to stop me! I gotta twenny-inch bicep.

"Stop botherin' me, Doc," I says, and push him away. He's so light my little shove picks him up and sends him flyin' across the room. He trips and falls over the leg of a swivel chair. Another little rabbit in a white coat comes in, looks at me, says to Doc Lee he's gonna get the guards, and runs out. I turn around again and start pushin' buttons and pullin' levers. God! I've never seen so many buttons and dials in all my life.

The stubborn little bastid is on my back again, climbin' all over me. I pull him off and hit him, easy-like, and he folds up with a wheeze like a Wop's squeezebox. Them bigdomes sure bleed easy . . . he'd probly pull a muscle if he tried to lift even *one* o' them cans in the other room. Yeah, I bet he would.

I pull down on a handle stickin' out from the wheel like a gear-shift lever. Snick! I hear the bolt slide back.

Goddam! These eggheads don't miss a trick. A siren screams, and a round light redder 'n my Pa's nose winks at me like a whorehouse gone wild. A sign flashes on and off, the same sign that's on the radia-active cansters . . . looks like that Iron Cross Grampa brought back from the big war, 'cept it's red and has one arm gone. The Jerries thought they were tough, too, but my Grampa put 'em in their place . . . and *he* couldn't read, neither.

I start to open the door, but that stubborn sonofabitch squeezes in between me and the door. He spits out a couple of his teeth at me and yells something 'bout five thousand "rentgenth" or something like that. Haw! Even Pa never tried to tell me *how many* goblins would get me if I didn't watch out.

I don't even bother to push him outa the way. I just reach around him and grab the wheel again. *I'm drivin'* now. The doc screams again and runs outa the room. I hope that gimp in his leg I gave him won't last . . . he runs pretty dam fast with it, though. But now I'm gonna pick up those cans like I said I could . . . and I don't need no goddam mechanical arm, neither.

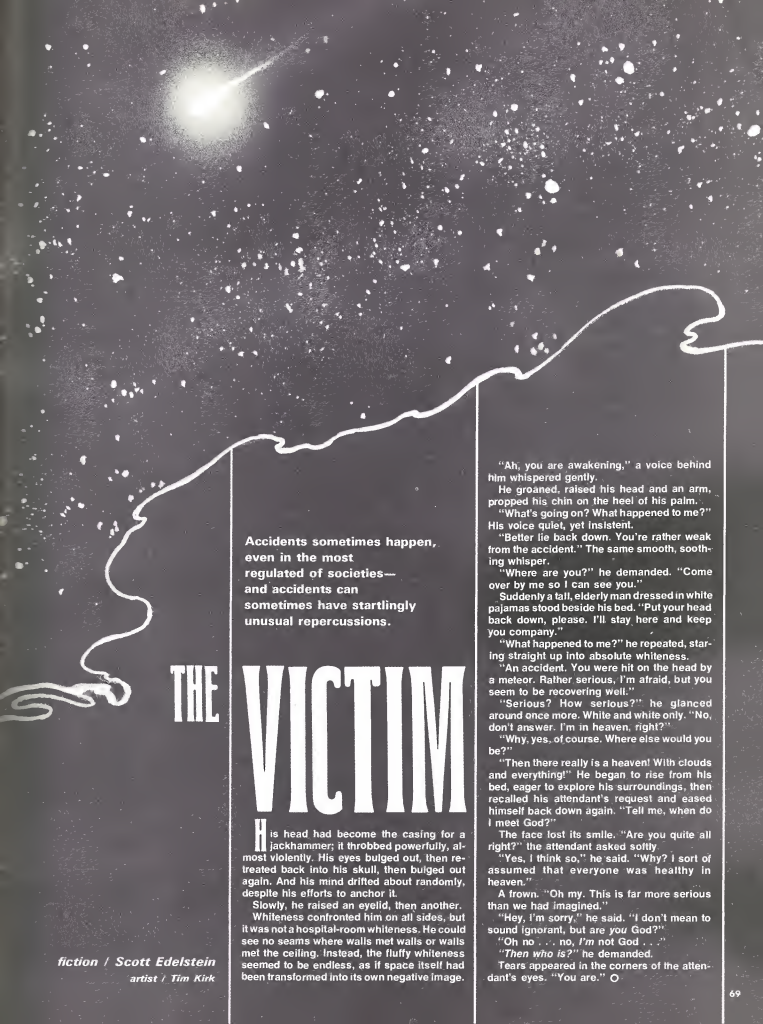
I pull on the wheel and the door swings open.

See? Nothin's happened . . . don't feel a thing. ○



*How easy it might be—
and how terribly deadly—
to confuse the demons
the mind,
the terrors of the past,
the fears of childhood,
with the dangerous realities
of the present.*





Accidents sometimes happen,
even in the most
regulated of societies—
and accidents can
sometimes have startlingly
unusual repercussions.

THE VICTIM

His head had become the casing for a jackhammer; it throbbed powerfully, almost violently. His eyes bulged out, then retreated back into his skull, then bulged out again. And his mind drifted about randomly, despite his efforts to anchor it.

Slowly, he raised an eyelid, then another. Whiteness confronted him on all sides, but it was not a hospital-room whiteness. He could see no seams where walls met walls or walls met the ceiling. Instead, the fluffy whiteness seemed to be endless, as if space itself had been transformed into its own negative image.

"Ah, you are awakening," a voice behind him whispered gently.

He groaned, raised his head and an arm, propped his chin on the heel of his palm.

"What's going on? What happened to me?" His voice quiet, yet insistent.

"Better lie back down. You're rather weak from the accident." The same smooth, soothing whisper.

"Where are you?" he demanded. "Come over by me so I can see you."

Suddenly a tall, elderly man dressed in white pajamas stood beside his bed. "Put your head back down, please. I'll stay here and keep you company."

"What happened to me?" he repeated, staring straight up into absolute whiteness.

"An accident. You were hit on the head by a meteor. Rather serious, I'm afraid, but you seem to be recovering well."

"Serious? How serious?" he glanced around once more. White and white only. "No, don't answer. I'm in heaven, right?"

"Why, yes, of course. Where else would you be?"

"Then there really is a heaven! With clouds and everything!" He began to rise from his bed, eager to explore his surroundings, then recalled his attendant's request and eased himself back down again. "Tell me, when do I meet God?"

The face lost its smile. "Are you quite all right?" the attendant asked softly.

"Yes, I think so," he said. "Why? I sort of assumed that everyone was healthy in heaven."

A frown. "Oh my. This is far more serious than we had imagined."

"Hey, I'm sorry," he said. "I don't mean to sound ignorant, but are you God?"

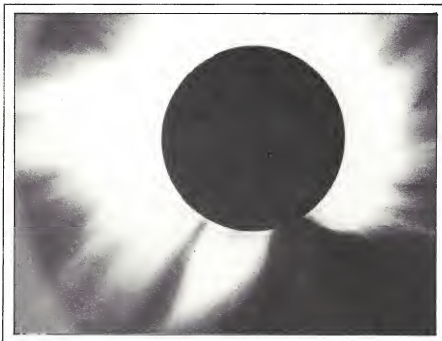
"Oh no . . . no, I'm not God . . ."

"Then who is?" he demanded.

Tears appeared in the corners of the attendant's eyes. "You are." O

BLACK HOLE MINES

from page 63



The atomic nuclei themselves collapse. When the Radius, R , gets small enough that:

$$R \text{ is equal to or less than } \frac{2GM}{c^2}$$

where M is mass, G is the Newtonian universal gravitational constant (present value,

$$6.67 \times 10^{-11} \frac{\text{m}^3}{\text{kg sec}^2}$$

but some cosmologists think G has changed since the formation of the universe; it's an empirical value, not something basic to the universe; and changes in G do really weird things to the structure of the universe. That, however, is another article) and c is our old friend the speed of light.

A quick look at that equation will give you, besides a headache, the idea that Black Holes can be very small and still contain a lot of mass. In fact, a Black Hole the mass of our sun wouldn't be more than about a kilometer across. In the original theory of Black Holes there weren't thought to be any small ones, because it would take such enormous gravitational forces to form them. There's no theoretical reason why small ones can't exist—any matter that gets compressed to where the radius is less than the $2GM$ size will be a Black Hole, and once a Black Hole

is formed it's stable. In fact, once formed, it grows every time it contacts any matter. But, because it takes so much force to make a Black Hole, nobody thought there'd be any small ones.

Comes now a young man named Michael Hawking. He's an Englishman, crippled, unable to walk. He talks and writes with great difficulty. And the world's leading physicists think he may be to Einstein what Einstein was to Newton.

Hawking has revolutionized the theory of relativity. He's also worked on the theory of Black Holes and their relationship to entropy. As part of his work he's shown how Black Holes may have been formed during the Big Bang that created the universe. Once formed, they never vanish; and they must still be out there somewhere.

Or are they? Black Holes aren't precisely in our universe. Light cannot come out of them. The gravitational field close to a Black Hole is so intense that the "escape velocity" is greater than the speed of light; light undergoes infinite red shift and vanishes before it can leave the Hole. So does nearly everything else. However, gravity waves can come out of Black Holes, and it's thought that we've detected some of them. Where they come from no one knows, but most

gravity waves seem to come from the core of our galaxy.

Anyway, Black Holes have mass; that is, they interact with normal matter through gravity. They can orbit a sun, for example. They can also have an electric charge. You could manipulate a charged Black Hole, carry it around, vibrate it with an electromagnetic field, and like that. You'd only do those things to a little one, of course; there's no way to vibrate something as massive as the sun, or even a good sized asteroid. But if there were tiny Black Holes, say a kilogram or so in mass, you could vibrate it to produce gravity waves.

We already have antennae to detect gravity waves. Black Holes could instantly be used for a new form of communication. They penetrate matter nicely, so to talk to Sydney from Los Angeles you just aim your gravity wave generator downward toward Sydney and let fly. There are even more interesting things we can do with them, and I'll get to that in a minute.

Hawking's theory suggests that a lot of Black Holes may have been formed during the Big Bang. They'll still be around. When they encounter a large object, they'll tend to be attracted to it. If the Hole is big enough, it will "eat" the object and go on growing. Most would be very small, though.

For example, it's now thought there's a good chance that there is a Black Hole massing 10^{28} grams in the center of the Sun. Any matter that it contacts will vanish down it, disappearing from the universe; but since the Hole in the Sun, even at that enormous mass (Earth masses 6×10^{27} grams; the asteroid Vesta masses 10^{25} ; so a 10^{28} gram Hole in the Sun is respectable; lots of asteroids are much smaller) will only be 10^{-10} centimeters across, it can only swallow a few atoms a day. The Sun will never miss them.

Most Black Holes, in fact, will be smaller than atomic nuclei. They'll pass right through large objects, then back again, through and through, gradually losing velocity relative to the object that attracted them, eating up a few atoms at each pass, until they

ADAMANT EVE

from page 61



come to rest in the center of whatever they encountered. There are probably Holes inside all the planets including Earth. Unfortunately, they aren't very easy to get at.

Except in the asteroid belt. Out there we could find a lot of Black Holes, little ones, big ones (but not too big, as I'll explain in a moment), all sizes. We already have mass detectors that would tell if an asteroid weighed too much. All we have to do is get the detector to the asteroids. Then we search, and when we find our overly massive asteroid, move it out of the way.

The Hole will still be in orbit around the sun—the same orbit as the center of the asteroid was in. We pick up our Hole and bring it home.

It could be most any size. The theoretical lower limit for a Hole is 10⁻³ grams; but there isn't an upper limit. In fact, from what we can measure, our whole universe very closely satisfies the $R = \frac{2GM}{c^2}$ equation, and we

may be a Black Hole in somebody else's universe.

On the other hand, we know from the orbits of the other planets and asteroids that there aren't any *really* big Black Holes in the asteroid belt. If there were, they'd move the other asteroids around. But the largest one out there, although very tiny in size, could still be as massive as, say, Earth's Moon. It would have the radius of a large atom. Even so, tiny as it is, if we could get out there, and there were one that size around, we could find it. Easily. You don't miss something the size of the Moon, and you don't miss something that has as much gravitational pull either. Not close up.

It's more likely, though, that we'd find Holes of kilogram size, or that order of magnitude.

Is there any evidence for all this, or is it merely a nice thought from far out scientists given an assist by a science fiction writer?

Well, it happens that Pluto drives astronomers crazy. It's right where Lowell predicted it would be, and the orbit is just right: in fact, there

shouldn't be any reason to question Lowell's calculation that Pluto, to have the proper effect on Neptune and Uranus, must mass about six times as much as the Earth.

No reason, except that when the Palomar Big Eye took a look at Pluto, it seemed to be about 3600 miles in diameter—about the size of Mercury. If Pluto massed six times the Earth it would have to have a density hundreds of times that of water; and the densest known normal material, osmium, is only 22 times as dense as water.

So, if Pluto is as massive as theory says, and as small as observation shows, there's something strange about its structure.

Could it have a Black Hole inside?

There are also asteroids thought to be far too small for the mass we believe they have. This has been explained by assuming they are less bright than we think; but it might be due to something else.

Black Holes inside would produce strange asteroids. With so much mass in such a small volume, the surface gravity would be quite high. It's theoretically possible to have asteroids less than a mile in diameter with surface gravities as great or greater than Earth's. (And no, of course the asteroid wouldn't mass as much as Earth; you get the high surface gravity because you're so close to all that concentrated mass.)

Finally, if we had Black Holes of reasonable size—say one to a few hundred kilograms—we could do some very practical work on gravity and inertia. When you can generate gravity waves at will you can experiment with their interactions—not only with electro-magnetism, but also with inertia and momentum.

You see, Michael Hawking's work suggests that inertia and gravity may be related but separable, like magnetism and electricity, and that we might be able to play games with gravito-inertial systems. Such as building a Black Box that sucks out the inertia from your space ship.

This would give us low cost, low energy space transportation, not only to the planets, but to the stars.

And that's another article. ○

up, but I'm certainly not going to make it with a snake. Now would you please leave. If I can't have the companionship of one of my own kind, then I want to be alone."

As the girl with the disc eyes turned away to study her reflection further in the water, the snake realized the futility of continued discussion. He sulked for about a quarter of a mile until he came to a piece of equipment that had been parachuted down to the planet. He instantly recognized it as the transformation machine.

The snake chuckled. "Of course. I'll simply force Eve into the machine and change her into a female snake."

The snake frowned. "Except forcing that girl to do *anything* is an impossible task."

The snake shrugged. "All right, if I must, I must. I'll transform myself into one of *her* kind."

Having made up his mind, he set the automatic controls, bid a tearful adieu to snakehood, and slithered into the machine.

There was a buzz, a whir, a clank, a groan, a whistle, a hum, a tweet and a toot.

Groggily, the creature that was once a serpent tottered from the machine.

"I've got legs. I can walk and run and jump," he enthused, doing all these things.

Eagerly, he bounded over the hills, scampering toward the sandy stream. The girl, seeing him approach, rose to her feet in surprise and wonderment.

"Leapin' lizards!" she exclaimed.

A smile lit her features as she welcomed him into her arms.

"What a pretty boy," she cooed, petting him. "And you've got blank circle eyes just like mine!"

"Arf!" said the former snake, wagging his tail happily. ○

ALAS, POOR TIDY TOIDY GIRL

fiction / Rachel Payes

"... And so, as president of Stellar Hostleries, serving the world with Good Beds, Clean Restrooms, and Bacon and Eggs for Breakfast, I am happy to present the Tidy Toidy Girl award of the year to Miss Gwendolyn Winterbottom, who inspected a grand total of one thousand, sixty three Stellar Hostleries Approved Restrooms located on seven continents."

Item from Friday column of Reggie Knowall: *Rumor has it that one of our leading hotel chains plans interplanetary expansion. Another 'star' in their crown?*

Dear Margie,

I'm so excited. It was thrilling when they gave me the Tidy Toidy Girl of the Year award—it's the cutest little pin—a gold toilet brush. Now my supervisor has told me I'm up for a wonderful new job—and I'll be graduating from restrooms to the entire inspecting range—food and lodging as well.

They've given me a battery of psychological tests. Oh, I do hope I pass them. They haven't said where the territory will be; but as I've covered the seven continents this past year, it's bound to be familiar.

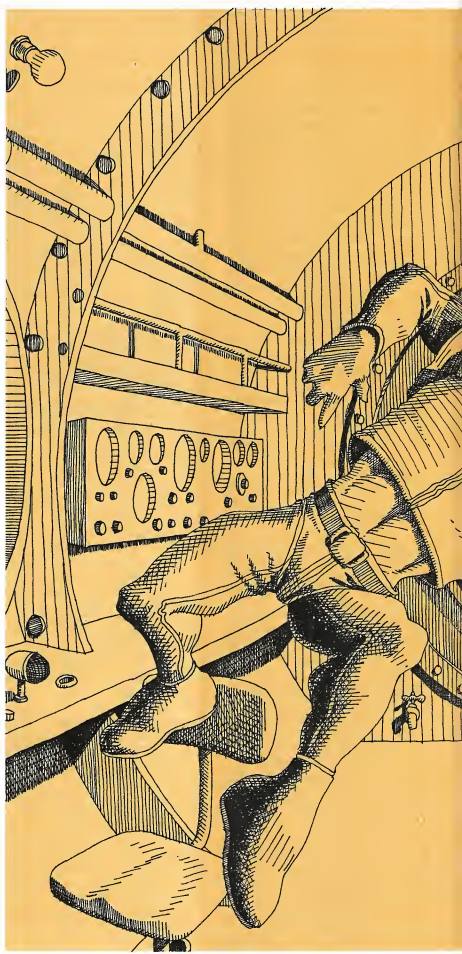
Love,
Gwen

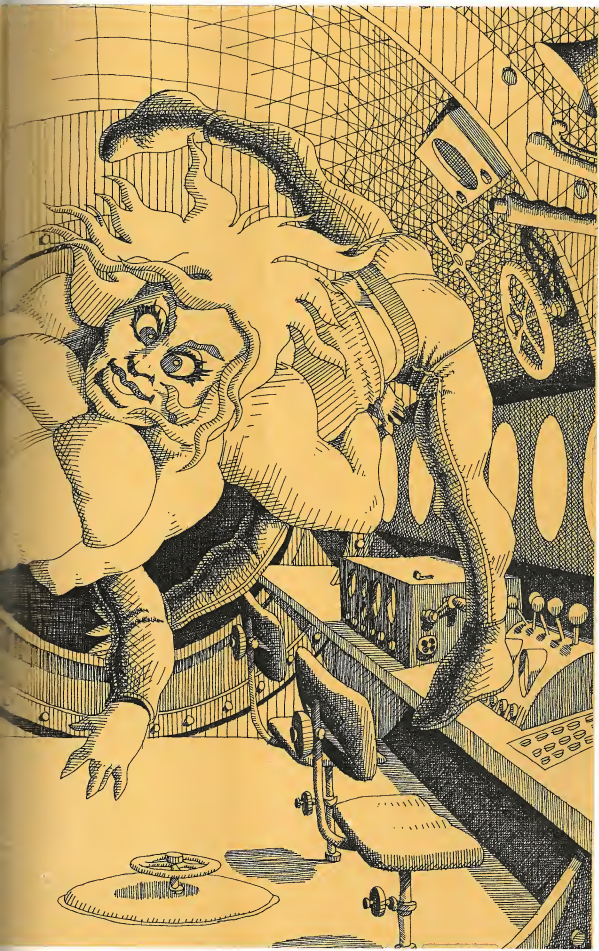
P.S. Each interviewer I talk with mentions the fact that I'm a founding with no next of kin. I do hope this doesn't work against me.

G.

Item from Your Friendly Broker: *Expect a jump in Stellar Hostleries common stock. They have purchased Gentry Starline and plan to push tourism in space.*

Feature from Scandal Monger: *Exclusive Interview with Gwendolyn Winterbottom, Stellar Hostleries' Star Inspector.*





The trouble with carrying your prejudices into space is that you might find them to be deadly misconceptions on some other planets.

Q. Are you nervous about touring the outer galactic planets, Miss Winterbottom?

A. No, it's just too exciting for words to be the first inspector in space.

Q. Have you ever taken a space trip before?

A. No, but I've traveled by rocket to the seven continents.

Q. Then you don't expect to get space sick?

A. (Ed. *Here Miss Winterbottom gave a superior little smile*) Not with Stellar Hostelties' *Space Pills* to chew.

Q. What is your first planetfall?

A. New Batavia, in the Coral System.
Q. Best of luck, Miss Winterbottom. Have you any special message for our readers on the eve of your departure?

A. Just that I intend to uphold the standards of Stellar Hostelties—Good Beds, Clean Restrooms, and Bacon and Eggs for Breakfast.

Entry in medical log of S. H. Starliner
E: One patient, Miss G. Winterbottom, suffering acute space sickness. Patient is allergic to *Space Pills*.

Postcard received by Miss Margie Spooner from Port Jump-off: Dear Margie, Wish you were here—or I were there. Have been dreadfully space sick. They assure me my system will acclimatize in time. If it weren't for all the publicity, I'd resign right now. Just thinking about inspecting kitchens and restrooms makes me feel queasy.

Love,
Gwen

Excerpt from Inspection Report 1,
Location—New Batavia in the Coral System.

Subject: Good Beds.
Personal observations by inspector (G. Winterbottom)

Sleeping here is rather awkward, as the natives are winged, resembling in some respects giant bats. They sleep hanging head down from bars which reach across the sleeping quarters near the ceiling. I found it impossible to cling to these bars without falling, as I am not constructed in the same manner as the New Batavians. Slept rather uncomfortably on the floor all night.

Recommendation by inspector: *Ham-mocks*.

Excerpt from Inspection Report 2,
Location—Qinzgg in the Lzr System.

Subject: Bacon and Eggs for Breakfast.

Personal observations by inspector (G. Winterbottom)

The first egg the waitress served to me cracked itself, and out crawled a horrid snakey thing. It seems they have no chickens here. The only eggs are reptilian. On an empty stomach, or after a night out, this can be a bit disconcerting.

Recommendation by inspector: *Maybe cereal's safer here.*

Excerpt from Inspection Report 3,
Location—New Hades in the Dante System.

Subject: Clean Restrooms.

Personal observation of inspector (G. Winterbottom)

They have NO restrooms in New Hades (that's the hell of it!). The natives are real, honest-to-fire-breathing dragons. They burn it up, and the smoke goes up the chimney. They just do not metabolize the way humans do.

Recommendation by inspector: *Portable, disposable potties for unwary tourists.*

Excerpt from Inspection Report 4,
Location—Love-Love in the Friendly System.

Subject: Good Beds.

Personal observations by inspector (G. Winterbottom)

It wasn't that there was anything wrong with the beds. On the contrary, they were terrific. Round, Emperor size, covered with velvet or fur, and very comfortable. Never a squeak. It took a while to get used to the huge ceiling mirror, but I did manage that after a few nights. But I never did get used to the Love-Love natives' ideas of hospitality. They could give lessons to the Eskimos.

Recommendations by inspector: *Don't let this get noised around, or the ticket offices on Earth will be stampeded.*

Excerpt from Inspection Report 5,
Location—Outer Muglubia in the Chintzie System.

Subject: Clean Restrooms.

Personal observations by inspector (G. Winterbottom)

I haven't caught sight of a single native, as they are reputed to be extremely shy, but I'd like to see what they look like! The restrooms are empty tiled cubicles about 3 feet by 3 feet by 15 feet high. There is an opening about one foot in diameter in the middle of the ceiling. (Maybe they blow their tops.)

Recommendations by inspector: *See recommendations in Inspection Report 3.*

Excerpt from Inspection Report 6,
Location—Iggay Eye-stay in the Armbay-Arday System.

Subjects: Good Beds and Clean Restrooms.

Personal observations by inspector (G. Winterbottom)

They're regular pig pens!

Recommendations by inspector: *They could use a Clean-up Committee here—and a whole bouquet of toilet bowl brushes (and not fancy little gold ones, either).*

Further reports on Iggay Eye-stay

Subject: Bacon and Eggs for Breakfast.

The natives, who resemble overgrown hogs, are hostile. There was a demonstration at the space port, and I was mobbed by these swine carrying signs saying, "*Cannibal, go home!*" I can't understand it. I never tasted human flesh, and I never intend to. I was rescued by the local constabulary, who seemed annoyed with me. Why, I can't imagine. I didn't even refer to them as "pigs." I tried to explain my position to the local officials, but they were downright pig headed. I'm now virtually a prisoner in the Stellar Hostelry—they say it's for my own protection.

They do have odd customs here. The chef of the hotel just came to my room to measure my mouth. Do they tailor-make the size of the bites? Perhaps I've been a bit harsh on them.

I heard loud cheers outside my window, and looked out to see a large basket of apples being carried into the hotel. Perhaps they're fixing apple pie for me, as a special treat—a sort of peace offering.

Item from Monday column of Reggie Knowall: *Whatever happened to Stellar Hostelties' Tidy Toady Girl, who was sent to outer space to inspect facilities for them? Their drum beaters have been silent of late. Could they be busy muffling their drums?*

Item from Your Friendly Broker: *Stellar Hostelties common stock fell ten points when it was rumored that they were unloading Gentry Starline and releasing all extra-terrestrial franchisees.*

"... And so, as president of Stellar Hostelties, serving the univ—uh—the world with Good Beds, Clean Restrooms, and Bacon and Eggs for Breakfast, I am happy to present the Gwendolyn Winterbottom Memorial Tidy Toady Girl Award of the year to..."

APOLLO-SOYUZ MISSION

from page 51



Thomas P. Stafford, Vance D. Brand and Donald K. Slayton were recently named as crewmembers for the U.S. half of the Apollo-Soyuz mission.

participated in operational support roles for other Apollo missions. Brand was born in Longmont, Colorado.

Slayton, 48, is also a civilian and is one of the original seven astronauts selected in April 1959. He was scheduled to fly the Mercury 7 mission, which flew in May 1962, but was relieved of that assignment when a heart condition was discovered. He refused to quit the space program, even though he wasn't allowed to fly a mission, was named Coordinator of Astronaut Activities, and since November 1963 he has been Director of Flight Crew Operations. In March 1972, following a comprehensive medical review, Slayton was restored to full flight status. He is a native of Sparta, Wisconsin.

Slayton, who will be 50 by the time he gets into space, was recently asked how it felt to be making a "come-back" at this late date; whether it bothered him.

"Well, no. I've always been a slow starter, I guess. For some people life starts at 40, and for me it's going to be more like 50, but I guess I'd rather be a 50 year old rookie than a 50 year old has-been. That's one way to put it. It doesn't bother me at all. I'm in as good a physical shape as about anybody you can find around here (the Manned Spacecraft Center), and I intend to stay that way."

Next Slayton was asked about the strenuous physical testing that he, and the rest of the original seven astronauts, went through, and the fact that men his

age weren't even considered for the program in those days.

"I don't think anything's changed all that much. I don't think it was ever all that big a deal to begin with, except that it was an unknown quantity in those days and I think we had to fly some flights to prove that it really wasn't. But I think these guys can correct me, but in my opinion the biggest physical work we've had in Apollo flights has been associated with the lunar surface operations. It's certainly not launch and reentry. And it's certainly no big deal there. We're talking about a shuttle here in the future that we anticipate being able to haul anybody up to orbit as a standard passenger. And we certainly wouldn't expect to run everybody through a full nine yards of physical exams any more than you would to go out and fly on a 747 from here to Tokyo or someplace. I don't think I consider the physical part as being all that big a deal."

It seems as though every time NASA decides to hold a press conference (about once a month) there's been a major change in the flight plan for the Apollo/Soyuz mission, which is only natural when you consider that it is still two years away, and the space program is still moving at such a fantastic speed that what might be a brand-new and exciting idea today is completely out-of-date tomorrow. The latest plans go something like this, though:

The Russians will launch first, and will have two complete launch vehicles and Soyuz CSM's on pads, so in case some-

thing goes wrong with the prime vehicle they can immediately launch the backup. Although there are several launch windows for the Apollo to rendezvous, the first shot is some 7½ hours after the Soyuz launch. The two vehicles will orbit separately for two days before docking, then will go through several dockings to give everyone on board a chance to run through the docking maneuvers.

After the final docking two of the U.S. crewmen will go through the docking module and into the Soyuz, stay a while, then return to the Apollo for a night's sleep. The next day two U.S. astronauts again go over to the Soyuz, but only one returns, bringing one of the Soviet cosmonauts with him. Later the other U.S. astronaut, the one who stayed in the Apollo, escorts the Russian back to the Soyuz, stays there with him, while the American who had already gone over comes back to the Apollo with the other Russian. Or something like that. Unless they change their minds again in Houston.

After two full days of this the Apollo and Soyuz will separate, their prime mission completed. Present planning calls for the Apollo to stay in orbit for up to 10 more days conducting various experiments, but, with only a 5 day endurance, it is doubtful if the Soyuz will stick around for long. The Soyuz will reenter and make the usual Russian soft landing in Central Russia, while the Apollo will come down in the usual Apollo landing-place—in mid-Pacific.

One unusual, and unexpected, facet that came to light during the early stages of mission planning was a language problem. The crewmembers selected, both backup and prime crews, immediately began studying Russian, and the Russian technical experts who were here to study our operations, and who will be working in Houston Mission Control during the flight of Apollo/Soyuz, began studying English. Then they discovered that being fluent in the other's language wasn't nearly enough. One Russian, Dr. Tatistcheff, who speaks excellent English, visited Mission Control during a practice mission and discovered that he didn't understand a thing. Space has produced a vocabulary of its own, and not just in technical areas. Indeed, it looks like, just as in the old space operas, spacemen may someday have a language all their own. And both NASA and the U.S.S.R. Academy of Sciences are officially working on that language right now, for use by the crewmembers of Apollo/Soyuz One. **O**

FUTURE PERFECT

from page 45

steady for Step Two."

Dalkins, who had located the older man; saw that he was standing a few feet away watching the "marriage ceremony," and saw that the man seemed so convinced that all was going well he had half-turned away.

"Now!" thought Dalkins.

The pix-phone rang. Dr. Buhner pressed the button that connected the tiny receiver in his ear and said, "Dr. Buhner here."

The picture that formed on the pix-plate was that of his erstwhile visitor and confidante. The man said, in a fretful voice, "Roosley at this end. What went wrong?"

Buhner could not fail to notice the accusing tone of blame, and he said, "We must first of all have an understanding, you and I."

"About what?" Astonished voice and face.

"I had no control over that situation. The law does not permit it."

"You had your observer on the scene."

Buhner ignored the second assignment of blame. "Have I made my position

the face in the pix screen. Finally: "What are you going to do?"

"Nothing."

"Why not?" Sharply.

"There's no law against what Steven did."

"You mean you can deactivate a machine, and shoot your way out of a locked building?"

"Harmonic Compensation may sue him for damages, but since he has no money it will do them no good."

"B-but," his caller protested, "isn't it illegal to be in the condition Steven is in now, a sexually free male?"

"No."

"But—" the other man groped.

"It is required by law that a male child reaching the age of puberty have his sex performance capacity placed under control. It is required by law that he can get married, since marriage is a man-made relationship, only if he goes through the process of being recompensated and aligned with his future wife. If this does not happen, then no marriage has legally taken place. You see," Dr. Buhner continued, "the technique for all this has been taken from the old Chinese

own apartment."

"And where is Steven?"

"He has not yet returned to his apartment."

Roosley said after a pause, "As I understand it, for the first time in a quarter of a century a male is out there—" he made a vague gesture with his arm, taking in half the horizon—"who is able to perform the sex act with more than one woman?"

"That used to be the way every male was."

"And that is not illegal?"

"No, it is merely undesirable. But it's a natural state. No natural human state has ever been specifically declared to be illegal."

The face on the pix-screen, in the course of a few moments of contemplating the potentialities of the situation, had acquired a distinct mottled look. The man muttered, "But good God, one man and all those unmarried girls and women between eighteen and twenty-three!"

"It could be," soothed Dr. Buhner, "that seduction is not his purpose. For that he didn't have to get rid of his money."

Roosley said blankly, "But what could be his purpose?"

"My assistants," said the psychiatrist, "are continuing to check into Steven's background, trying to find the clue."

"What do you think he will do now?"

"He seems to have covered his tracks well," the older man admitted reluctantly. "I have no report on him. Maybe he's woman chasing."

Roosley made a choking sound in his throat. And broke the connection.

Buhner hesitated, then spoke a very special number. This time, when there was a click, no face came on the pix screen, but a man's voice, deep, determined, interested, said, "I've read your report, doctor. I agree that Steven should receive publicity. If your prediction about him does not come true, at least we'll have made our first try this decade. Good luck."

clear?"

"Yes, yes." Resignedly.

"What happened," said Dr. Buhner in a brisker tone, "is that again our Steven seems to have taken the trouble to discover in advance the details of a process that most people go through without pre-knowledge."

"When it was done to me," said Roosley, "I was in a locked room, strapped into a chair. I didn't have a chance to get away."

"If," said Dr. Buhner, "you had brought along a computer repairman's key, and an automatic pistol to shoot your way through a locked door—"

There was an impressed expression on

Communist People's Army concept, except there's no death penalty. But it's simply now, as then, a trap for the unwary individual who, in both the Communist and in our situation, was a teenage male still in a naive state. Before he can think we capture him sexually. Before he can grow up we align him sexually with his future wife, and the law states that once this is done it cannot be undone. The state is justified in taking these arbitrary steps because its goal is a peaceful, hardworking populace."

Pause.

"Where is Steven's wife now?"

"She's not married. The final step was not completed. She has returned to her

Steven sat on his buttocks on the grass, his back against a tree at the edge of the park, and stared up into the sky. It was a pose. Actually, he was keeping a sharp lookout for possible spies. He was not entirely certain that he had got away without being seen. He presumed that the treasury lords would like to find out how he proposed to survive without money.

"It's easy," he called out to four suspicious looking men who walked by while he sat there (as if they would understand

his meaning). "The world pays more for creativity and most for successful rebellion. Tell that to your masters."

One of the four, a puzzled individual of about thirty, came over, and said, "Hey, you're the fellow who gave away your million, according to the news report. Why?"

Steven said, dazzled and delighted, "You mean, they're giving me publicity?" He caught himself; shrugged, said, "Move along, bub. If you don't know why, telling you wouldn't do any good."

About dusk Steven came lazily to his feet. Sauntering—in case there was a watcher—he walked back into the park to where a tiny stream flowed into a culvert. Bending, he reached into the darkness of the culvert, groped, and then straightened. In one hand he now held a waterproof container. From its interior he drew a rolled-up sign. This, like a sandwich-man of old, he slipped over his head. The front of the sign was a white canvas with a message on it. The message was:

**I'm Steve Dalkins, the nut
who gave away his million
dollars.**

The back of the sign, also canvas, read:

**I invite you to hear my
story any night at West
Park, 8 o'clock.**

That part didn't mean what is said. Maybe, if it could be arranged, he'd send somebody over there, in case people showed. But the purpose would be to mislead possible observers.

Steven walked along, confident, smiling. The sky grew dark, and the sidewalks began to give off the light they had accumulated during the day. Walls of stores glowed in the same way. People walked up, glanced at him and his sign, and moved past. Most gave some kind of disapproving indication; but the alert Dalkins noticed one here, one there, who had a different reaction.

To each of these, if it could be done, he spoke quietly in a low voice, "We've got to do something—right? Meet me any night at the—" and he named another park. The biggest moment of the evening occurred when a young man with a flushed face briefly fell in step beside him, and said, "You got a plan for beating these bastards?"

"Sure have," said Steven.

The young man did something twisty with his body. It was a gesture that had in it an infinite hostility. "I'm with you, and I'll bring the gang. My name is Jack."

"Good."

The group that first night at ten consisted of eight single responders, including two young women, and a surprisingly large group of seven intense young men and four equally sincere young women. This was Jack's "gang."

There were no questions of why. Each male and female *knew* that this had to be done. Each was relieved that someone had at last taken the step of no-return.

It was as if they all had their own view of the reality of things deep inside their viscera; and *that* part was taken for granted. Only the details of what to do needed to be worked out. And, of course, there Steven had his plan.

They organized *Overthrow Associates* that first night. It was agreed that Steven Dalkins would be recompensed for his lost million. Each person present at the founders meeting wrote him a check for \$1,000. All future members—it was authorized—would be assessed the same amount entirely on behalf of Steven.

"You may not get back your full million," said the flush-faced man, Jack Brooks, "but surely we can get together as many determined persons as were

behind the assassins of Alexander the Second of Russia in the 1880s. Surely, five hundred is not too much to expect."

"I think there'll be more than that," said Steven, non-committally.

At the end of Month One, there were 2782 members. Each member during Month Two was given the task of locating five more alienated persons. Since the receipts totaled more than a million, Steven said he would donate the difference to expenses. He had confided the first step of his plan to a small inner circle of the conspiracy, which included Jack. These individuals told inquiring members that the plan was "the greatest," but that it would be unwise to reveal its details to any but key figures.

Overthrow Associates had 53,064 members when, shortly after the end of Month Four, it undertook its first act of total defiance.

The authorities had decided to publicize Steven's condition. Girls and women were urged, if they were approached by a small young man, to call the police if he manifested ulterior motives. Buhner, in his reports, doubted if



***"He thereupon explained and
demonstrated (on himself and a
girl who suddenly appeared)
the chemical method whereby the sex
alignment of a man and wife
could be terminated."***

any woman would be resistant to the charms of a sexually free male. However—he suggested—Steven couldn't be sure of that, and so he would be the careful one.

Nevertheless, the psychiatrist, when he lay awake at night, felt somewhat more restless than was usual for him.

Daytimes he monitored Steven's progress by the number of checks that were made out to him. As the total grew, a shiver of anxiety almost visibly oscillated through those members of the United Governments who, by agreement, had to be kept informed of such matters.

Whenever people got too nervous they contacted Buhner. This particular morning the caller was a beefy face with an edgy voice that said, "What are you doing about these rascals?"

"We're getting ready for a clean-up."

"How do you mean?"

Buhner explained. Police were turning their attention from routine, and pointing toward an elemental force. Out of the woodwork of the society, a strange breed of human creature was emerging. The tense, determined individuals were drawn into the light by a common impulse to smash an environment that, in some obscure way, had angered them.

Their non-conformist impulse to do

The society, of course, did not permit people to be arrested merely because they wrote a check to Steven Dalkins. There had to be an association with an illegal action.

"But what can they do to a perfect world?" That was the question most often asked of Dr. Buhner, and here it was again. He made the same statement now as he had in the past. "Twelve years ago Charley Huyck led a revolt aimed at our computer education system. Twenty-three years ago the rebellion of the Gilbert brothers had as its target the group method of electing politicians. After each outbreak, all of the participants were arrested, charged with being alienated persons, convicted, and disposed of."

"What," asked the heavy-faced VIP, "do you think Dalkins will attack?"

"Something more basic is my feeling."

"For God's sake," exploded the politician, "what could be more basic than an attack on the political system?"

"Well—" temporized Buhner diplomatically.

The edgy voice calmed, and said, "Do you think Dalkins is aware that you can follow up all those checks?"

"Yes, I think he knows because he has transferred some of the money over to a company."

himself, that Steven has been behaving like a responsible person all these months and has *not* been out there on a seduction spree?

But if not that, what had he been doing?

The next morning looked absolutely delightful when he glanced out of the window of his high-rise apartment. The sky was as blue as a brightly lit tidal pool... A little later, he was peacefully, and unsuspectingly, eating a delicious meat substitute breakfast—when the red emergency light flashed on his media set. The alarm buzzer sounded. Then a young man walked onto the media screen. He began:

"Ladies and gentlemen, we do not be alarmed. This is a message from Overthrow Associates. We have temporarily taken over the principal broadcast centers of the American continent. We want to tell you something our leader, Steven Dalkins, believes you would like to know."

He thereupon explained and demonstrated (on himself and a girl who suddenly appeared) the chemical method whereby the sex alignment of a man and wife could be terminated. He named several locations where the chemical could be secured locally, and said that similar messages were being broadcast from the other stations across the land.

He urged: "Have your check for \$1,000 ready, and remember this may be your only chance to get the little case of syringes with the compensating shots in them. You can buy them now and decide later if you'll actually use them. If you're a person of decision you'll act at once before there is any interference with the sale, and think later."

One of the locations named was about a mile from Buhner's apartment. In seconds he was out of the door and heading groundward in a high-speed elevator... Outside, he ran for an electric taxi. En route, he wrote out his check. Even as it was, by the time he had paid the taxi fare several hundred men and about fifty women were crowding around a helicopter which stood at the edge of a small park. As Buhner pushed forward, waving his check as the others were doing with theirs, he saw that three girls and four men were passing out small boxes, and another man and girl were taking the checks, examining them, and putting them into a metal container.

The psychiatrist was barely in time. He handed over his check, waited nervously while it was scrutinized, and then grabbed the box that was held out to him. He was still backing away, clutching

***When it was done, Jack Brooks paced the floor.
"That S.O.B.," he said, "is going to get away with
over 800 million dollars."***

violence had its own purity. They loved each other and were loyal to their group leaders. In earlier decades there had been other dramatic actions to motivate affection for and obedience to one or more leaders. In this instance, *this* year, they were proud to be associated with someone who had had the will to give away his million dollars. After that, nobody vaguely questioned the right of Steven Dalkins to be "the boss."

That made it easy for the police. All the checks were made out to one man. The signatures were written plain to see. Every man, boy, girl, and woman was identified; and the computers sent print-outs to police centers across the land. Quietly, detectives visited each person's neighborhood, and located him or her, exactly.

"Oh, that! But, surely, in this special situation—"

Buhner shook his head firmly. "How companies spend their money cannot be checked on, because it might give a tip to their competition. The computer system would either have to be re-programmed, or a public statement would have to be made by the authorities. But we don't want to do that. We want to catch all of these people and get rid of them."

That night, as Buhner lay awake, he was disturbed to realize that slightly over four months had gone by. So if Roosley's fantasies had been ever approximately true, then it was time for violated virgins to be showing up in small hordes. What was disturbing was the possibility that there weren't any. Could it be, he asked

the precious kit protectively, when one of the young people yelled a warning: "The police are coming. Beat it, everybody!"

In bare seconds the nine were inside with their cartons ad their checks. As the door started to close, the machine lifted into the sky like a scared falcon. Up there it looked exactly like the dozens of other craft like it in which buyers had arrived and which had for many minutes been taking off from all the surrounding streets.

Buhner arrived at his office looking dissheveled, but he made his report to Top Level feeling triumphant. The report from the government laboratory later that day confirmed that the seven syringes of the kit he had bought did indeed contain the de-alignment chemical.

According to a still later report from the computer network, Overthrow Associates sold 883,912 kits that day at 6224 locations for \$1,000 each. And the checks were all made out to Steven Dalkins.

Power and money cast long shadows. The images in the minds of certain shocked persons flickered with the possibility that the next allotment of chemicals would bring in 8 billion, or even eighty.

I was too much. Dark rumors came to Steven's ears. He thought: *the*

turning point! That very day he dialed the computer code that connected him to his followers everywhere in a closed circuit. He placed himself in front of the pix camera.

There he stood. His eyes were small gray marbles bright with intelligence. His cheeks were flushed. His small body was tense. He glared into the eyepiece, striving to fix every viewer out there with his determined gaze.

He explained the views of the shocked members, whose leader was Jack Brooks, and he finished, "Jack's vision has proved greater than mine. Every man has his limitations. What has already happened seems to be just about what I'm capable of. So—

He paused dramatically, then made his firm statement, "I hereby resign any control that I have had of *Overthrow Associates* in favor of my dear friend, Jack Brooks. I give you all my love and best wishes."

He finished graciously, "I'll still sign checks for all valid purchases for the next move of the organization. For that you can always reach me on the code. Good-bye to all you wonderful people."

As Steven's voice and face faded, in a distant apartment a young man with a red face that was positively scarlet grabbed his own pix-phone, spoke a number, and yelled into it, "Steven, you so-and-so, what do you mean—valid

purchases? I want a total power of attorney over the cash in your account, except for maybe ten million. Show your sincerity."

They were on private line, so Steven said, "If I don't retain control of the money, you might be tempted to do something against me."

"Sign over twenty-eight million right now to pay for the next allotment," screamed Jack.

"Okay," said Steven.

When it was done, Jack Brooks paced the floor. "That S.O.B.," he said, "is going to get away with over 800 million dollars."

He stopped pacing, scowled; said, "Like hell he is." He walked to the pix-phone again. This time he called Dr. Buhner, and said, "Every evening at dusk Steven Dalkins takes a walk in one of the parks."

The psychiatrist had at least three meetings to attend while he considered what he would do with the tip-off...

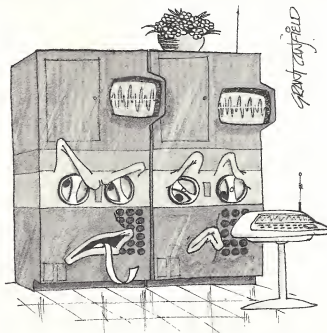
—First, with computer engineers and administrative staff. The question: Were the great thinking machines programmed to check out 883,000 names?

The answer: There were endless flows of exact logic, total information somewhere, every transaction of every person available, not a single natural barrier in the entire system—so, yes.

Buhner's second meeting was with the directors of the bio-chemist guild. They had an analysis for him on the basis of one clue. A long-time employee, who was not a member of the trust group that controlled the sexual de-alignment ingredient (one of seven) manufactured at the plant where he worked, had quit his job a few months ago. Investigation had shown that he had made a secret, unofficial study of chemistry over many years.

"We may speculate," concluded the board, "that a group of seven or more persons either separately motivated or in a conspiracy sought employment in such laboratories long ago, and bided their information until someone like Dalkins came along."

—Buhner's third meeting was with a committee of the United Governments. A leading economist explained in a shaky voice to the distracted members of the committee that the million dollars to everybody system depended on the statistical reality that the needs of the populace be consistent. An additional expenditure of \$1,000 per person by a sizable percentage of adults must not happen.



"Stupid goddamn human programmers! I ought to give them a good quantum of my data bank!"

"No question," thought Buhner, "Steven has hit the perfect world a blow below the belt—"

The problem was, what to do about it. In his own speech, he said cautiously, "It would appear as if the attempt to control mankind's genitalia has been nullified by Steven Dalkins as an incidental act in the accomplishment of a secret goal of his own."

He pointed out—when 800,000 persons did a similar act of vandalism against a system, then by theory the system must be examined and not the individual.

He made his recommendations and concluded, "I refrain from offering a solution for Steven himself. Vague rumor has it that he is trying to break off his connection with his followers. That may not be easy to do."

At noon the next day, the United Governments issued a determined-voiced statement through their elected secretary:

It has been deemed inadvisable to permit 883,000 males to prey on a hundred million unmarried young women. The United Governments accordingly authorize drug outlets to make available hormonal de-compensation kits to those persons over eighteen who choose to unalign themselves with their spouses. The price of the kit shall be \$10. The names of all persons who make this choice will be publicly available. If individuals who have already purchased the kits turn them in before the end of the current month their names will not be among those posted.

As Jack Brooks heard those fateful words, he leaped to his feet and charged against the nearest wall of his apartment, hitting it with one shoulder. Flung off by the force of his violent action, he threw himself at another wall. Presently, exhausted, he sank into a chair and brooded on the reality that no one could pay \$10 would buy the same product for \$1,000.

His fantasy of 8 billion was now a mere foam of rage in his clenched mouth. The rage was directed entirely at one person: Steven. Steven must have known this would happen . . . How can we get even with that—that—that?—

Steven Dalkins, all fourteen of him, took his usual evening workout shortly after dusk. At least, those were the reports relayed back to Buhner by the agents he sent to each of the city parks.

Could one of the fourteen be Steven

himself? It didn't really matter, for Buhner's purposes. He stood across the street from the public pathway of one of the parks, and watched a five foot six youth jog toward him. If it was Steven, he was well disguised. A good makeup job concealed every significant feature of his face.

As this particular Steven came opposite him the psychiatrist walked rapidly across the street. "Please tell Mr. Dalkins," he said loudly, "that Dr. Buhner would like him to call. Tell him he's now going to have to admit why he did all this—"

That was as far as he got. Dalkins turned in mid-stride, ran across the street, and then along the sidewalk. Suddenly, he seemed to see what he wanted. He darted to a car by the curb just as a woman was climbing into it. There seemed to be some struggle between them; which Dalkins won. The car started up. The last thing Buhner saw was the machine receding down the street, with Dalkins at the wheel and the woman lying back against the seat. Her head rolled limply, and she slipped out of sight.

Buhner's men found the abandoned car twenty minutes later with the dead body of the woman owner lying on the floor of the front seat.

"Let him get out of that!" said Jack Brooks when the news was phoned to him by the murderer. His flushed face smirked into a grimacing smile. "Sending out fourteen of him was the smartest idea I've had up to now."

He was feeling better for another reason. There was a possibility that a percentage of men would be willing to sign over a car or other property in exchange for the kit rather than pay \$10 and be identifiable and on a list. It was too bad that there was no cash in the perfect world, and that every money transaction had to be by computer credit, but still—he shrugged—there was always a way.

The murder was announced over the news media; the circumstances described.

"Now—" the psychiatrist reported—"Steven has no alternative. He has to contact us."

It was a quarter after three when Steven phoned Dr. Buhner.

Carrying his equipment, the psychiatrist arrived at the prearranged rendezvous. A man at the door guided him to a large, tastefully decorated anteroom. The pretty girl there escorted him through a door to a large inner office, then closed the door behind her as she

departed.

Silently, Buhner set up his equipment, then faced the youth who sat behind a gleaming desk. Steven Dalkins waved him at the two vacant chairs, one soft and one hard. The M.D. settled into the hard chair.

"Hm," said Steven, "I was wondering which one you would choose."

He leaned back with a twisted smile on his small face. "How does it feel, doc, to have someone giving you that superior treatment?"

Dr. Buhner stared at him with his pale, gray eyes, and said, "Steven, slightly over forty thousand members of *Overthrow Associates* had been arrested by the time I started out for your place."

"This is only one of my places," said Steven.

The older man ignored the interruption. "Four out of five have already elected to go voluntarily to one of the space colonies. That way they can keep their money for sure." He smiled grimly. "Not everyone cares to gamble his million."

"So only I am in jeopardy?"

"Steven," said Buhner tensely, "who could have killed, or ordered the killing, of that woman?" As the silence lengthened, Buhner said, "Maybe we've already got him in custody, and can verify your story in a few seconds." He indicated the machines that were focused on the boy in front of him, and urged, "Steven, you mustn't be loyal to someone who's trying to pin a murder on you."

"What happens to a convicted murderer?" asked Steven, after another pause.

"Nobody is convicted of murder in our day," was the reply. "The *only* crime is alienation."

"All right, what happens to a person convicted of alienation?"

"That's classified information."

"The rumor is that they're executed. Is that true?"

"I'm not a member of the board that handles that. I've heard the rumor." Buhner smiled his grim smile. "Now that you've met some of them, Steven, what would you do with alienated individuals?"

Steven hesitated. "It's unfair," he said finally, "for the unalienated to pass judgment on those persons who, through some accident of childhood trauma, got to be alienated."

"But you noticed?"

There was a faraway expression in the boy's eyes. "Many of them are exceptionally warm-hearted—" he temporized.

Buhner refused to be sidetracked. "Steven, how many murders that you heard about were committed by your followers in the past four months?"

The barest shadow of a sad smile was suddenly on Steven's face. "Most of them are alienated about other things," he said, "but those who are alienated that way killed about eight hundred persons."

"Why? Did you find out why they did it?"

"The victims said or did something that violated the ideals of the murderer."

"And so," said Buhner with the touch of grief in his voice that he always felt at such revelations, "in this great universe where a man's life, so far as we know, is only a tiny span of years, they, in their inner fury of rightness, denied even that short a time to nearly a thousand human beings. Tell me, what should be done with people like that?"

Once more, their gazes met. This time, the boy looked away quickly. And there

seemed no question. The four months of close contact with the endless twists and distortions of truths which alienated persons live by had left their scarring marks.

On his face was the consequent judgment.

Steven said, "His name is Jack Brooks."

Buhner pressed some buttons on his machinery, watched the dials briefly; then: "He's among the captured." Once more, manipulation, followed by the comment: "The computer is asking him if he ordered, or committed, the murder. He denies it. But his heart, his lungs, his liver, his blood vessels, tell a different story."

Their gazes met across the control instrument. "Well, Steven," said the older man, "I've been proceeding on the assumption that you're an unalienated person, and that therefore—though it would be a little hard to imagine what it could be—you have some deep-mean-

ing reason for what you have done."

Steven said, "I should like you to accompany me somewhere."

"Could you use some reliable witnesses?"

"Yes."

Buhner and the United Governments' secretary, and Roosley, and two other important persons, stood behind a tree on one side of a tree-lined street as Steven walked across to a small suburban house on the other.

He stopped outside the gate and whistled twice long and twice short.

A minute went by. Then the door of the house opened.

Out of it there emerged a rapidly moving figure of a young girl. A child? No. She charged over to Steven Dalkins and flung her small body against his small body with an impact that sent him back several steps. The two—the dynamic girl and the high energy boy—thereupon proceeded to hit one mouth against the other, and to squeeze their bodies together in a series of minor but definite blows.

"Good God!" said Buhner, involuntarily, "he did all this in order to marry a girl his own age."

As if he had heard the words, or deduced that they would be spoken or thought, Steven turned and called out into the gathering dusk, "But it's not illegal; not now."

"Love," mumbled the psychiatrist. "I haven't thought of anything like that since I gave up little Esther when I was eighteen."

Suddenly, his legs wouldn't hold him. He lay down there on the grass, vaguely aware of the others bending over him anxiously.

It was ridiculous, of course, but the shameful tears streamed down his cheeks. After all, he hid himself, Little Esther would now be big Esther, married with a brood of Esther-ettes. And, besides, it was well-known that people always out-grow age eighteen attachments.

The arguments, so cogently true, flapped unheeded through his head. The feeling that had leaped at him out of his forgotten past somehow conveyed the wordless meaning that he had never been given the chance to grow through those emotions. Muttering, Buhner struggled to his feet, shook away helping hands, and hurried off along the darkening street.

He had important things to do, like recovering from thirty years of living without love. ○



2000½ A SPACED ODDITY

/from page 53



"A tribe of savage apes dances to the background strains of Red River Valley. Others approach, shrieking, jumping up-and-down; it may be that they do not like Red River Valley!"

Next morning the tribe forages for its breakfast: roots and berries. The group comes upon a huge object, black and rectangular. A strange sound is heard; all pause, awed. They cannot see the upper surface of the object; it is too high. Could they view it, they would see but not understand the message in Vegan script: "Live Cargo. Other End Up."

Again the second tribe approaches. Shrieks are shrieked; faces are made; ups-and-downs are jumped. But the Old Man of the first tribe remains silent; he makes no faces and does not jump. He is thinking. Finally he picks up the thighbone of an antelope and with it smashes the skull of the Old Man of the

second tribe. The latter flee. It is time for lunch: nuts and grasshoppers.

The first tribe does not forage for nuts and grasshoppers. In prehistory, a great milestone has been reached. Man has invented cannibalism.

A spaceship thrusts itself up from Earth. Inside, one man sits alone amid a number of empty seats. Outside can be seen the famous name "Mother Ferguson's Space Line And Storm Porch Company," painted over the original legend "V-2."

The man shuffles papers from his briefcase in obvious boredom, puts them away again. He ignores the lovely stew-

ardess who offers her repertoire of demure King's-X flirtation. He looks around the ship's interior. The stewardess passes by; this time she ignores him also. Serves him right.

The ship lands on the Moon alongside the Serenity-Hilton. The lone passenger has reservations; he checks in at the quaint old-fashioned modernistic 20th-century desk. In the bar he meets some old friends.

A lady greets him. "Hello there, Joe. What are you doing here?"

"Adjusting to the crummy gravity, like everybody else."

"Aw, come on, Joe. You know you can trust me; I won't tell anyone."

"Sure, I know," he says gently, patting her under the clavicle. "Well, I have to go now. Goodbye, Brenda Starr." She looks after him wistfully.

In his hotel room the man looks somehow pensive, as though troubled by irregularity. His eye lights upon the picturephone, and lights. He punches seventeen digits by pushbutton. The screen glows red, indicating that he forgot to punch the area-code first.

Eventually he gets it right. A picture appears, that of a young girl. Not too young; either she has passed puberty or she owes much to the garment industry.

"Hello?" she says.

"Hello, dear. My, but you've grown!"

"Hello?" she says. Although electromagnetic waves travel at 186,000 miles per second and the Moon is about 240,000 miles from Earth, there is no delay between statement and response, due to anti-delay networks developed by Bell Laboratories. The advantage of these devices is even more evident, later on.

"Yes, hello!" he says. "I said, you've grown!"

"I suppose so. I seldom shrink!"

"But only two weeks ago, dear, you were just a little girl. Now you're a young woman. I never heard of such a thing!"

"You ever hear of getting a wrong number, clabberhead?" The screen goes blank.

Next day our man attends a secret meeting fraught with dire verbiage. A dozen or so people calmly tell each other a lot of things they already appear to know. Our man, who is being briefed, is the only one who doesn't know what everyone is talking about, because nobody ever states anything explicitly. The scene is very true to life, for a true-life scene.

Spacesuited, our man and several others inspect the depths of an excavation on the bare vacuum-packed surface

of the Moon. Vacuum does not conduct sound, but the "Red River Valley" is playing; their helmets are wired for Muzak.

The group reaches its goal: a huge black rectangular object, still half-buried in the Lunar conglomerate. A strange sound is heard; everybody falls down. No one knows why they fall down, or whether they ever get up.

On the bottom of the object, still buried, is the notation in Vegan script: "Do Not Litter. Use This Container."

In deep space a ship is enroute to Jupiter or Saturn, depending on who wins the toss. Aboard it, two men are talking with a third sentient member of the crew, a highly-developed computer called Henry 8000, who speaks very softly. To be polite about it, Henry 8000 sounds as though he might have been assembled at the bottom of someone's garden.

"Henry," says one crewman, "I can't seem to find the rest of the crew. Do you happen to know where they might be?"

"Why, I'm sure I don't know, Laurel," croons Henry. "Where have you looked?"

"In the Bullmoose Room; where else?" says Laurel. "Once you're in the deep freeze, you don't walk around a lot, you know."

"I wouldn't know about that," says Henry 8000. "I don't walk around much, anyway. Is it pleasurable to walk around, Laurel?"

"Well . . ."

The second crewman cuts in. "Hold it, Henry; this is Hardy. Are you sure you don't know where the rest of the crew is?"

"Why, of course I'm sure, Hardy. Statistically, at least."

"But . . ."

"It is now time for your exercise period, Hardy."

"I want to know a few things first!"

"Please, Hardy; let's not have any unpleasantness. I'll tell you what; we'll have a game! I'll give you 55 seconds to get to the airlock and put your space-suit on before I let all the air out. Starting—now!"

Hardy scrambles to the airlock and frantically dons his suit. He wins the game with four seconds to spare. Now it is time for exercise.

The planners of this expedition know the vital importance of exercise on a prolonged space mission; they do not leave it to chance. Deliberately, they have shorted the fuel supply. In order

that the mission may succeed, once in each 24-hour period a crew member must go outside the ship for one hour. And push.

Laurel is in his quarters. If he isn't bored silly he's faking it nicely. His picturephone screen lights. He yawns and says "Hello."

"Hello, Stanley," says a lovable grey-haired old lady. "This is Momma."

"I can't come over for dinner, Momma. I'm busy."

"I know, I know; a mother is always wrong. Just remember someday, Stanley." The screen goes blank.

The ship lurches forward heavily for a moment, but Laurel doesn't notice. Why can't his mother understand that you can't always get away for dinner at a moment's notice? Especially when you're halfway to Jupiter or Saturn and can't find most of your crew.

The exercise hour is long past, but Hardy has not returned. Laurel punches one of Henry's buttons. "Hey, Henry; where's Hardy?"

"Why, I'm sure I don't know. Isn't he with you?"

"You know he isn't. You can see all over the ship, you peeping-Henry."

"But I don't tell, do I?"

"Never mind that. Is Hardy on the ship, or isn't he?"

"Well . . . he isn't."

"Why not?"

"I had to accelerate to avoid a meteor, Laurel."

"So it's goodbye-Hardy? Is that right?"

"Yes, I'm afraid so, Laurel. I'm sorry, you know. I really am."

"Yeh. I'll just bet you are."

"Well, I am! And now might I have a little silence for some decent mourning, you crude man?"

"Yeah; crude. First, you tell me what happened to the rest of the crew!"

"Laurel, dear boy; believe me, that knowledge would not help your morale."

"DAMN my morale! You tell me . . .!"

"Ooh; what you said!"

"Never mind what I said; let's hear what you say."

"You know, it's going to spoil your whole day, Laurel."

"Between you and my mother you're beating a dead horse. Get on with it."

"All right, Laurel, if you insist. But if I had known you were going to be like this, I wouldn't have even wanted to be your friend."

"Say it!"

"Well—a food-freezer went bad and all the other meat spoiled, Laurel."

It is an urgent moment. Before Henry 8000 can move to exhaust the air from

the ship, Laurel pulls his plug. Down the drain swirls Henry's consciousness, counter-clockwise.

Another historic milestone has been reached. Man has invented a machine that has invented cannibalism.

Laurel's ship is approaching Jupiter or Saturn; Laurel can't be sure, because of the ringing in his ears: "The Red River Valley."

Suddenly in his viewscreen appears a huge black rectangular object. A strange sound assaults his being: he reaches blindly for the pain-reliever most often recommended by doctors. The object looms, then vanishes to one side as the ship swings left and plunges into a montage of spectra swinging wildly up and down the electromagnetic scale at 186,000 miles per second. Laurel barely has time to realize that instead of aspirin he has dropped about 600 mikes of "clear window" acid. He has not seen, on the black monolith, the clear Vegan script that reads: "No Left Turn."

Several hundred years later, subjective time, Laurel recognizes a few realities among the splendors of his visual display. He is coming down; so is the ship. No matter that it has not been built to land anywhere; it does, anyway.

Just alongside is a nice big homey-looking house, fresh out of early 20th-century Earth. Laurel doesn't question it; he's still more zonked than not.

He leaves the ship, paying no heed to whether the air is fit to breathe. It must be; he doesn't fall down.

Laurel is now inside the house. Oh, it is so homey! And well-kept, too. He sits down to a meal, served by no seen hands. He smells the meat first.

He opens a door to another room and sees an older version of himself. The practice must be habit-forming, because the second one opens another door and sees a really decrepit specimen of Laurel.

"How come we are getting so old so fast?" says the latter. "We better stop this, or we're in real trouble."

"I know," says the other. "But I have this problem. Every time I come to a door, I open it and there you are."

"Well, try to watch it; OK?"

"Sure. And you try not to be there. Right?"

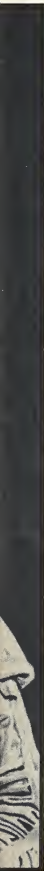
Somewhere two skeletons face each other through a door frame. One of them says nothing; the second answers in kind.

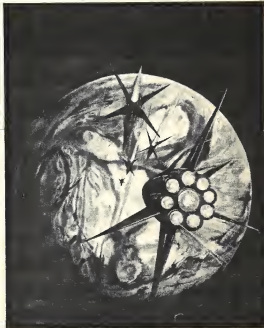
At the other end of everything, a baby mumbles. It's probably hungry. ○

THE ART OF JOSH KIRBY

Ever hear of Shelfanger, Diss?
Well, that's where, in the Old
Rectory, a young man named
Josh Kirby is to be found. You
may not know who Josh Kirby is yet,
but, if you're a science
fiction fan, chances are you
will before very long.
While he hasn't been seen much
(yet) in the United States,
his work is familiar over much
of the rest of the world,
illustrating stories
from Burroughs to Bradbury
and back again in Britain,
doing magazine art for German,
Belgian and Dutch publications,
and, most recently, doing
art for the covers of ACE and
DAW paperback books.







Mild-mannered, married and just past twenty-five, this talented Englishman draws the smallest, most intricate and detailed pictures since the late Virgil Finlay. A man who is proficient in several of the established science fiction "styles," such as those of Powers, Bama and Emsh, Kirby is developing a distinctive of his own, which you will see next month—on the cover of VERTEX.



ALL THE BRIDGES RUSTING

from page 23

motel on the Pacific Coast Highway thirty years ago. "There's another thing. What are we really doing if we do it Whyte's way? We're talking the public into not backing a space project. Suppose they got the habit? I don't know about you—"

"I just plain like rocket ships," said Jerryberry.

"Okay. Can you really talk the public into this?"

"No. *Lazarus* didn't even cost this much, and *Lazarus* almost didn't get built, they tell me. And *Lazarus* failed, and so did the colony project. So: no. But I'm not sure I can bring myself to talk them out of it."

"Jansen, just how bad is public support for the Space Authority?"

"Oh... it isn't even that, exactly. The public is getting unhappy about JumpShift itself."

"What? What for?"

"CBA runs a continuous string of public opinion polls. The displacement booths did genuinely bring some unique problems with them—"

"It solved some too. Maybe you don't remember."

Jerryberry smiled. "I'm not old enough. Neither are you. Slums, traffic jams, plane crashes—nobody's that old except Robin Whyte, and if you try to tell him the booths brought problems of their own, he thinks you're an ungrateful bastard. But they did. You know they did."

"Like flash crowds?"

"Sure. Any time anything interesting happens anywhere, some newspaper is going to report it. Then people flick in to get it from all over the United States. If it seems big enough you get people flicking in just to see the crowd, plus pickpockets, looters, cops, more newspapers, anyone looking for publicity."

"Then there's the drug problem. There's no way to stop smuggling. You can pick a point in the South Pacific with the same longitude and opposite latitude as any given point in the USA and most of Canada, and teleport from there without worrying about the Earth's rotational velocity. All it takes is two booths. You can't stop the drugs from coming in. I remember one narcotics cop telling me to think of it as evolution in action."

"God."

"Oh, and the ecologists don't like the booths. They make wilderness areas too available. And the cops have their problems. A man used to be off the hook if he could prove he was somewhere else when a crime happened. These days you have to suspect anyone, anywhere. The

real killer gets lost in the crowd.

"But the real beef is something else. There are people you have to get along with, right?"

"Not me," said Karin.

"Well, you're unusual. Everyone in the world lives next door to his boss, his mother-in-law, the girl he's trying to drop, the guy he's fighting for a promotion. You can't *move away* from anyone. It bugs people."

"What can they do? Give you the booths?"

"No. There aren't any more cars or planes or railroads. But they can give up space."

Karin thought about that. Presently she gave her considered opinion. "Idiot."

"No. They're just like all of us: they want something for nothing. Have you ever solved a problem without finding another problem just behind it?"

"Sure. My husband... well, no, I was pretty lonely after we split up. But I didn't sit down and cry about it. When someone hands me a problem, I solve it. Jansen, we're going at this wrong. I feel it."

"Okay, so we're doing it wrong. What's the right way?"

"I don't know. We've got better ships than anyone dreamed of in 2004. That's fact."

"Define ship."

"Ship! Vehicle! Never mind, I see the point. Don't push it."

So he didn't ask her what a 747 circling the sinking Titanic could have done to help, or whether a Greyhound bus could have crossed the continent in 1849. He said, "We know how to rescue *Lazarus*. What's the big decision? We do or we don't."

"Well?"

"I don't know. We watch the opinion polls. I think... I think we'll wind up neutral. Present the project as best we can finagle it up. Tell 'em the easiest way to do it, tell 'em what it'll cost, and leave it at that."

The opinion polls were a sophisticated way to read mass minds. Over the years their sampling techniques had improved enormously, raising their accuracy and lowering their cost. Public thinking generally came in blocks:

JumpShift's news release provoked no immediate waves. But one block of thinking began to surface. A significant segment of humanity was old enough to have watched teevee coverage of the launching of *Lazarus*. A smaller, still significant segment had helped to pay

for it with their taxes.

It had been the most expensive space project of all time. *Lazarus* had been loved. Nothing but love could have pushed the taxpayer into paying such a price. Even those who had fought the program thirty-one years ago now remembered *Lazarus* with love.

The reaction came mainly from older men and women, but it was world wide. *Save Lazarus*.

Likewise there were those dedicated to saving the ecology from the intrusion of man. For them the battle was never-ending. True, industrial wastes were no longer dumped into the air and water; the worst of these were flicked through a drop ship in close orbit around Venus, to disappear into the atmosphere of that otherwise useless world. But the ultimate garbage maker was himself the most dangerous of threats. Hardly a wilderness was left on Earth that was not being settled by men with JumpShift booths.

They would have fought JumpShift on any level. JumpShift proposed to leave three men and three women falling across the sky forever. To hell with their profit margin; *save Lazarus*.

There were groups who would vote against anything done in space. The returns from space exploration had been great, admittedly; but they all derived from satellites in close orbit around Earth. Observatories, weather satellites, teevee transmitters, solar power plants. These were dirt cheap these days, and their utility had surely been obvious to any moron since Neanderthal times.

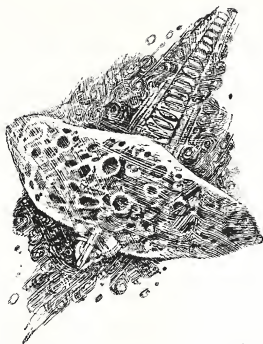
But what use were the world of other stars? Even the worlds of the solar system had given no benefit to Man, except for Venus, which made an excellent garbage dump. Better to spend the money on Earth. *Abandon Lazarus*.

But most of the public voted a straight *Insufficient Data*. And of course they were right.

Robin Whyte was nervous. He was trying not to show it, but he paced too much and he smiled too much and he kept clasping his hands behind his back. "Sit down, for Christ's sake," said Jerryberry. "Relax. They can't throw tomatoes through their teevee screens."

Whyte laughed. "We're working on that in the research division. Are you almost ready?"

"An hour to broadcast. I've already done the interview with Doctor Sagan.



**"Failure of
the first expedition.
A whole colony
fleet on its way
home without ever
having so much as
seen Alpha
Centaurus!"**

It's on tape."

"Let's see what you've got."

What CBA had for this broadcast was a fully detailed rescue project, complete with artist's conceptions. Jerryberry spread the paintings along a wall. "Using your artists, whom we hired for a week with JumpShift's kind permission. Aren't they beautiful? We also have a definite price tag. Two billion, three hundred and sixty million new dollars."

Whyte's laugh was still shaky. "That's right on the borderline. Barely feasible." He was looking at an artist's conception of the launching of the rescue mission: a stream of spherical fuel tanks and larger, shark-shaped Phoenix hulls pouring up through the ringed tower of the Corliss accelerator. More components rested on flat rock at the launch end. "So Gem thought of it first. I must be getting old."

"You don't expect to think of everything, do you? You once told me that your secretary thought of the fresh-water tower gimmick during a drunken office party."

"True, too. I paid her salary for thirty years, hoping she'd do it again, but she never did. . . . Do you think they'll buy it?"

"No."

"I guess not," Whyte seemed to shake himself. "Well, maybe we'll use it some other time. It's a useful technique, shipping fuel in Phoenix hulls. We'll probably need it to explore, say, Barnard's Star, which is moving pretty censored fast with respect to Sol."

"We don't have to tell them they can't do it. Just tell 'em the price tag and let them make up their own minds."

"Listen, I had a hand in launching *Lazarus*. The launching boosters were fueled by JumpShift units."

"I know."

Whyte, prowling restlessly, was back in front of the launching scene. "I always thought they should have drilled right through the asteroid. Leave the Corliss accelerator open at both ends."

Activity in the sound studio had diminished. Against a white wall men had placed a small table and two chairs, and a battery of teevee cameras and lights aiming their muzzles into the scene.

Jerryberry touched Whyte's arm. "Let's go sit down over there." Whyte might freeze up if confronted by the cameras too suddenly. Give him a chance to get used to it.

Whyte didn't move. His head was cocked to one side, and his lips moved silently.

"What's the matter?"

Whyte made a shushing motion.

Jerryberry waited.

Presently Whyte looked up. "You'll have to scrap this. How much time have we got?"

"But—An hour. Less. What do you mean, scrap it?"

Whyte smiled. "I just thought of something. Get me to a telephone, will you? Has Gem still got the schematics of the Corliss accelerator?"

An hour to broadcast time, and Jerryberry began to shake. "Robin, are we going to have a broadcast or not?"

Whyte patted him on the arm. "Count on it."

Gem Jones's big white-on-blue schematic had been thumbtacked to the white wall over the table and chairs. Below it Jerryberry Jansen leaned back, seemingly relaxed, watching Whyte move about with a piece of chalk.

A thumbtacked blueprint and a piece of chalk. It was slipshod by professional standards. Robin Whyte had not appeared on teevee in a couple of decades. He made professional mistakes: he

turned his back on the audience, he covered what he was drawing with the chalk. But he didn't look nervous. He grinned into the cameras as if he could see old friends out there.

"The heart of it is the Corliss accelerator," he said, and with the chalk he drew an arc underneath the tower's launch cradle, through the rock itself. "We excavate here, carve out a space to get the room. Then—" He drew it in.

A JumpShift drop ship receiver cage.

"The rescue ship is self-transmitting, of course. As it leaves the accelerator it transmits back to the launch end. What we have then is an electromagnetic cannon of infinite length. We spin it on its axis so it doesn't get out of alignment. We give the ship an acceleration of one gee for a bit less than two months to boost it to the velocity of *Lazarus*, then we flick it out to the drop ship."

"This turns out to be a relatively cheap operation," Whyte said. "We could put some extra couches in *Phoenix* and use that. We could even use the accelerator to boost the drop ship up to speed, but that would take four months, and we'd have to do it *now*. It would mean building another Corliss accelerator, but—" Whyte grinned into the cameras. "—we should have done that anyway, years ago. There's enough traffic to justify it."

"Return voyage is just as simple. After they pick up the crew of *Lazarus*, they flick to the Pluto drop ship which is big enough to catch them, then to the Mercury drop ship to lose their potential energy, then back to the Corliss accelerator drop cage. We use the accelerator for another two months to slow it down. The cost of an interstellar drop ship is half a billion new dollars. A new Corliss accelerator would cost us about the same, and we can use it commercially. Total price is half of what *Lazarus* cost." Whyte put down the chalk and sat.

Jerryberry said, "When can you go ahead with this, Doctor?"

"JumpShift will submit a time and costs schedule to the UN Space Authority. I expect it'll go to the world vote."

"Thank you, Doctor Whyte, for . . ." It was a formula. When the cameras were off Jerryberry sagged in his chair. "Now I can say it. Boy, are you out of practice."

"What do you mean? Didn't I get it across?"

"I think you did. I hope so. You smiled a lot too much. On camera that makes you look self-satisfied."

"I know, you told me before," said Whyte. "I couldn't help it. I just felt so good." ○

POUL ANDERSON

from page 37

tration of trying to make everything come out right, of trying to find the exact descriptive phrase, and so on.

VERTEX: Up to this point we've been talking about science fiction; its affect on you, and on the world. What about other interests which you have? The other things that you've done in your life—what are your other major interests?

ANDERSON: Oh, I suppose the usual human ones. I like to travel as much as possible; foreign countries, out in the wilderness, or just in scenic country. Or get out on the water in a boat of some kind. As a hobby I do a certain amount of gardening, carpentry, etc., etc. I enjoy good food and good wine. I think that a writer has to be interested in everything. There's no such thing as too much input.

VERTEX: That's an interesting line of thought. How do you go about accomplishing that?

ANDERSON: Just, more or less, by living the way I like to live. By reading a lot, meeting and talking to as wide a variety of people as possible, traveling, trying out different things, and so on.

VERTEX: Publications. Do you get a variety of publications?

ANDERSON: Oh, yes! We subscribe to a number of magazines, buy a lot of books, and so on. Naturally.

VERTEX: What about conferences and conventions? Do you get a lot of information out of them?

ANDERSON: Well, frankly, they're mostly just fun. To the extent that they are business, they tend to just be negotiations. Some editor might make a writer a good offer to do a book, or something like that. However, again, it's an opportunity to meet people. An astonishing variety of people show up at these things, and some of them become good friends.

VERTEX: So far we've been talking about things that are pretty well locked into this earth, and past experiences common to most people. Let's take to beyond that and go out into the stars, if we can. What feelings do you have about which direction the human race and the planet, this planet Earth, should go.

ANDERSON: As to the way it *should*

go, I've already admitted to being very much of a technophile. I think we should go on. I think, even without some hypothetical faster-than-light travel, we can make it out to the stars, if we want to. Whether we actually will want to badly enough, I don't know. I think we should, as you might say it's as much as spiritual thing as a matter of acquiring knowledge, or the power that comes from knowledge. At the same time, we can't neglect our own Earth. I've been active in various conservation movements for a long time, long before it became fashionable. We need to do much more there. Here, however, I'd like to point out to some of these "back-to-nature" people that man has always preyed upon the earth, has always used up his environment, and with modern machinery we merely do it faster. Actually, what we need is not less science and technology, but more of the right kinds, which will let us, for the first time, really understand how the biosphere works. Really, not just sit back and enjoy, but actually create something that has never existed before. A balanced ecology. So, while basically I would say that man is an animal, he's also a spiritual being. You can take this in a religious or in a non-religious sense, but he has emotions—he perceives mysteries, and he wants to belong to something bigger than himself. He's also a reasoning being; a being that can acquire knowledge, and usually wants to. I think all of these aspects are equally important, that we can't neglect any of them. From time to time we've over-emphasized one at the expense of the others. I would hope that eventually we can get to a balanced attitude, where we will develop all aspects of ourselves.

VERTEX: What do you think man will take with him when he goes to the stars? In the way of culture and feelings and development.

ANDERSON: That would depend very much on the technology itself. If you can get the favorite science fiction theme of vast fleets of space ships, with enormous cargo-carrying capacity, traveling much faster than light—then its one thing, because you can transport everything so much more easily. You can take your artifacts, you can take a lot of people, and so on. If, on the other hand, we suppose that it'll just be a matter of comparatively few vessels, with small crews, and with each expedition taking a long time, taking years at least, then what you can carry is much less, at least

in a material way. There's almost no limit, however, to how much information you can carry, especially with modern and future data bank technology. So there would be no reason, say, why a fifty man expedition, making a twenty year survey somewhere, couldn't carry along the entire culture of Earth in its data banks, to be referred to. On the other hand, fifty people don't really have enough room in their heads to carry all that. I would say, if man is going to go to the stars under those difficult conditions, he'll only do it carrying along his dedication, his desire to explore, to make himself more at home in the universe by coming to understand more of it, in much the spirit that the early polar explorers went. If, on the other hand, it turns out to be easy to get out there, then, you've got room for other motivations. You can see the human race, repeating all its old mistakes all over again. I really don't know how it will go. Just wait and see. I've said that science fiction has no more pipe-line to the future than anything else.

VERTEX: There are a lot of young persons in the world today interested in science fiction, and interested in what you have to say about it. In conclusion, what would you say to those people?

ANDERSON: Well, let me think. I know what I want to say because I've tried, again and again, to say it in my fiction, with varying degrees of success or failure. It sounds, perhaps, a little bit like a collection of clichés if just laid out explicitly. These are not the easiest times the human race has ever known, and they may get much worse before they get better. Even if they do get better, as we have found out here in America, peace and affluence have their own penalties. So, however much the world may change, and it is changing now faster than before, I think certain things will always be true. There will always be a need for the old-fashioned virtues, like courage and loyalty. There will also always be, a desirability for a spirit of inquiry, a spirit of open-mindedness, a respect for the integrity and freedom of the individual. I would like to think that, along with all the other things it has invented, the human race can keep these more recent inventions—namely those having to do with the rights and the importance of the individual. I'd like to think it can keep those alive.

VERTEX: Thank you very much, Mr. Anderson. ○

CONFRONTATION

from page 39

Her eyes widened slightly. "Yes?"

"Agent Thomas Varney—Robot Investigatory Agency," he said showing the badge with "RIA" set deep in blue letters. "Do you have some place where we can talk?"

A balding man in his early 50s stepped up. Although he spoke to the girl he kept his eyes on Varney. "Everything all right, Betty?"

Her voice was calm. "Yes, George, it's all right. It's a business matter. May we use your office?"

He waved his hand in assent, but slid his eyes again over Varney, who ignored him and followed the young woman to a door in the back of the hall marked "Private." He followed her through it and then leaned against it as she stood with her back to him, arms folded.

"Well?" she said after a moment.

Varney casually took a notebook from his pocket, flipped it open and read: "Since crossing over, subject has used the name 'Elizabeth Peters.' Given name: Helen Singleton. Believed to be residing in District 12, possibly Los Angeles and may be working as singer. . . ."

He looked up from the notebook at her back for a moment, then resumed: "Advanced model of 8300 series, number 72; created by Robco in Cleveland, 1991. . . ."

"1993!" she said, turning to face him.

Varney laughed shortly and returned the notebook to his pocket. "Just like a woman. . . . almost; you have to shave a couple of years off your age. All right, Miss Singleton or Miss Peters, you've got some explaining to do."

"I haven't done anything wrong."

"Come off it; I might buy that if you were an 8100 or even an 82 but you 83s can think independently. You're charged with illegally leaving place of residence, assuming false identity and failing to register with the authorities. And that doesn't even specify any charges from the Rebellion."

"You must believe I had nothing to do with that! The first I knew of it was when I saw people running and screaming in the streets. I tried to protect my owner but. . . ." Her voice choked off and she shook her head.

"You expect me to believe that?"

"It's true! Most of us were innocent but the people who had always resented us seized the opportunity to stampede the others. When Johnson and Keller escaped, everyone seemed to go crazy. Thousands of robots were deactivated, even the computers. Johnson and Keller are the ones you should be looking for."

Varney smiled. "If you mean 8309 and

8317, we caught up with them last month. They pleaded a lot, but it didn't do them any good in the end."

She rocked slightly. "Oh. Oh."

"We're wasting time," said Varney; "let's go downtown."

"Please, Mr. Varney; look at me. I was created from metal and wires and rubber but I'm as human as you are. I was programmed to Mozart and Shakespeare and a hundred others who celebrate Man's achievements. Souls aren't made of flesh and blood. Please!"

"You're wasting your time, sister," said Varney, "let's go."

Her eyes, mascara-smeared from the tears, suddenly blazed defiance. "You'll never believe me; I see that now, but others will. All right, then; I plead Article 9 of the Post Rebellion Constitution, trial by a jury of my peers."

Varney snorted: "What would that be? A parking meter and a vacuum cleaner?"

"No, Mr. Varney; other human beings. People were frightened before, but I can convince them of my innocence now. I'm ready to go."

He opened the door for her and then steered her by her arm to the sign marked "Exit." They walked down to the street level and he turned her around.

"You said something that sounded sincere up there. Do you think that you'll actually get a jury to believe you?"

"I'm sure of it."

He looked into her eyes and said: "I'm going to ask you a very important question and I'll know if you're lying. If we give you a break, will you help us track down the others who went into hiding?"

She hesitated for a second. "Why, I don't know how I could help but yes, I would, if they were guaranteed a fair trial."

"That's all I wanted to know he said," as he pulled a wedge-shaped object from his pocket. "Johnson and Keller said we couldn't trust you."

She opened her mouth but the scream died unborn as her face burst into a white-hot mass of writhing wires and running metal. She fell and Varney stepped over her body toward the door.

"Traitor," he hissed. "Traitor!" O



"If we give you a break, will you help us track down the others who went into hiding?"

WEED OF TIME

from page 58

begins. "Wait a minute," he says, "I've got a sample right here."

He reaches into the small sack and pulls something out. The camera zooms in on the Captain's hand.

He is holding a small plant. The plant has broad green leaves and small purple blossoms.

Dr. Phipps' hands begin to tremble uncontrollably. He stares at me. He stares and stares and stares. . . .

May 12, 2062. I am in a small room. Think of it as a hospital room. Think of it as a laboratory, think of it as a cell; it is all three. I have been here for three months.

I am seated on a comfortable lounge-chair. Across a table from me sits a man from an un-named government intelligence bureau. On the table is a tape recorder. It is running. The man seated opposite is frowning in exasperation.

"The subject is December, 2081," he says. "You will tell me all you know of the events of December, 2081."

I stare at him silently, sullenly. I am tired of all the men from intelligence sections, economic councils, scientific bureaus, with their endless, futile demands.

"Look," the man snaps, "we know better than to appeal to your non-existent sense of patriotism. We are all too well-aware that you don't give a damn about what the knowledge you have can mean to your country. But just remember this: you're a convicted criminal. Your sentence is indeterminate. Cooperate, and you'll be released in two years. Clam up, and we'll hold you here till you rot or until you get it through your head that the only way for you to get out is to talk. The subject is the month of December in the year 2081. Now, *give!*"

I sigh. I know that it is no use trying to tell any of them that knowledge of the future is useless, that the future cannot be changed because it was not changed because it will not be changed. They will not accept the fact that choice is an illusion caused by the fact that future time-loci are hidden from those who advance sequentially along the time-stream one moment after the other in blissful ignorance. They refuse to understand that moments of future time are no different from moments of past or present time; fixed, immutable, invariant. They live in the illusion of sequential time.

So I begin to speak of the month of

December in the year 2081. I know they will not be satisfied until I have told them all I know of the years between this time-locus and December 2, 2150. I know they will not be satisfied because they are not satisfied, have not been satisfied, will not be satisfied. . . .

So I tell them of that terrible December nine years in their future. . . .

December 2, 2150. I am old, old, a hundred and ten years old. My age-ruined body lies on the clean white sheets of a hospital bed, lungs, heart, blood vessels, organs, all failing. Only my mind is forever untouched, the mind of an infant-child-youth-man-ancient. I am, in a sense, dying. Beyond this day, December 2, 2150, my body no longer exists as a living organism. Time to me forward of this date is as blank to me as time beyond April 3, 2040 is in the other temporal direction.

In a sense, I am dying. But in another sense, I am immortal. The spark of my consciousness will not go out. My mind will not come to an end, for it has neither end nor beginning. I exist in one moment that lasts forever and spans one hundred and ten years.

Think of my life as a chapter in a book, the book of eternity, a book with no first page and no last. The chapter that is my lifespan is one hundred and ten pages long. It has a starting point and an ending point, but the chapter exists as long as the book exists, the infinite book of eternity.

Or, think of my life as a ruler one hundred and ten inches long. The ruler "begins" at one and "ends" at one hundred and ten, but "begins" and "ends" refer to length, not duration.

I am dying. I experience dying always, but I never experience death. Death is the absence of experience. It can never come for me.

December 2, 2150 is but a significant time-locus for me, a dark wall, an endpoint beyond which I cannot see. The other wall has the time-locus April 3, 2040.

April 3, 2040. Nothingness abruptly begins, non-nothingness abruptly begins. I am born.

What is it like for me to be born? How can I tell you? How can I make you understand? My life, my whole lifespan of one hundred and ten years comes into being at once, in an instant. At the "moment" of my birth I am at the moment of my death and all moments in between. I emerge from my mother's womb

and I see my life as one sees a painting, a painting of some complicated landscape; all at once, whole, a complete gestalt. I see my strange, strange infancy, the incomprehension as I emerge from the womb speaking perfect English, marred only by my undeveloped vocal apparatus, as I emerge from my mother's womb demanding that the ship from Tau Ceti in the time-locus September 8, 2050 be quarantined, knowing that my demand will be futile because it was futile, will be futile, is futile, knowing that at the moment of my birth I am have been will be all that I ever was/am/will be and that I cannot change a moment of it.

I emerge from my mother's womb and I am dying in clean white sheets and I am in the office of Dr. Phipps watching the ship land and I am in the government cell for two years babbling of the future and I am in a clearing in some woods where a plant with broad green leaves and small purple flowers grows and I am picking the plant and eating it as I know I will do have done am doing. . . .

I emerge from my mother's womb and I see the gestalt-painting of my lifespan, a pattern of immutable events painted on the stationary and eternal canvas of time. . . .

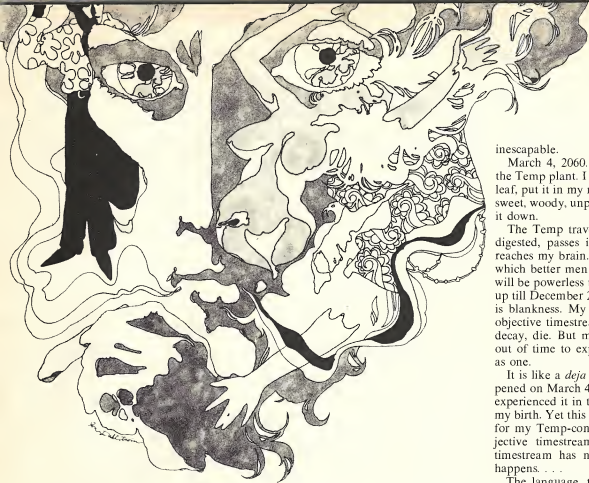
But I do not merely see the "painting," I am the "painting" and I am the painter and I am also outside the painting viewing the whole and I am none of these.

And I see the immutable time-locus that determines all the rest—March 4, 2060. Change that and the painting dissolves and I live in time like any other man, moment after blessed moment, freed from this all-knowing hell. But change itself is illusion.

March 4, 2060 in a wood not too far from where I was born. But knowledge of the horror that day brings, has brought, will bring can change nothing. I will do as I am doing will do did because I did it will do it am doing it. . . .

April 3, 2040, and I emerge from my mother's womb, an infant-child-youth-man-ancient, in a government cell in a mental hospital dying in clean white sheets. . . .

March 4, 2060. I am twenty. I am in a clearing in the woods. Before me grows a small plant with broad green leaves and purple blossoms—Temp, the Weed of Time, which has haunted, haunts, will haunt my never-ending life. I know what I am doing will do have



“ . . . I see the gestalt-paining of my lifespan, a pattern of immutable events painted on the stationary and eternal canvas of time.”

done because I will do have done am doing it.

How can I explain? How can I make you understand that this moment is unavoidable, invariant, that though I have known, do know, will know its dreadful consequences, I can do nothing to alter it?

The language is inadequate. What I have told you is an unavoidable half-truth. All actions I perform in my one hundred and ten year lifespan occur simultaneously. But even that statement only hints around the truth, for “simultaneously” means “at the same time” and “time” as you understand the word has no relevance to my life. But let me approximate.

Let me say that all actions I have ever performed, will perform, do perform, occur simultaneously. Thus no knowledge inherent in any particular time-locus can effect any action performed

at any other locus in time. Let me construct another useful lie. Let me say that for me action and perception are totally independent of each other. At the moment of my birth, I did everything I would ever do in my life, instantly, blindly, in one total gestalt. Only in the next “moment” do I perceive the results of all those myriad actions, the horror that March 4, 2060 will make has made is making of my life.

Or . . . they say that at the moment of death, one’s entire life flashes instantaneously before one’s eyes. At the moment of my birth, my whole life flashed before me, not merely before my eyes, but in reality. I cannot change any of it because change is something that exists only as a function of the relationship between different moments in time and for me life is one eternal moment that is one hundred and ten years long. . . .

So this awful moment is invariant,

inescapable.

March 4, 2060. I reach down, pluck the Temp plant. I pull off a broad green leaf, put it in my mouth. It tastes bitter-sweet, woody, unpleasant. I chew it, bolt it down.

The Temp travels to my stomach, is digested, passes into my bloodstream, reaches my brain. There changes occur which better men than I are powerless, will be powerless to understand, at least up till December 2, 2150, beyond which is blankness. My body remains in the objective timestream, to age, grow old, decay, die. But my mind is abstracted out of time to experience all moments as one.

It is like a *deja vu*. Because this happened on March 4, 2060, I have already experienced it in the twenty years since my birth. Yet this is the beginning point for my Temp-consciousness in the objective timestream. But the objective timestream has no relevance to what happens. . . .

The language, the very thought patterns are inadequate. Another useful lie: in the objective timestream I was a normal human being until this dire March 4, experiencing each moment of the previous twenty years sequentially, in order, moment, after moment, after moment. . . .

Now on March 4, 2060, my consciousness expands in two directions in the timestream to fill my entire lifespan: forward to December 2, 2150 and my death, backwards to April 3, 2040 and my birth. As this time-locus of March 4 “changes” my future, so too it “changes” my past, expanding my Temp-consciousness to both extremes of my lifespan.

But once the past is changed, the previous past has never existed and I emerge from my mother’s womb an infant-child-youth-man-ancient in a government cell a mental hospital dying in clean white sheets. . . . And—

I, me, the spark of mind that is my consciousness, dwells in a locus that is neither place nor time. The objective duration of my lifespan is one hundred and ten years, but from my own locus of consciousness, I am immortal—my awareness of my own awareness can never cease to be. I am an infant am a child am a youth am an old, old man dying on clean white sheets. I am all these mes, have always been all these mes will always be all these mes in the place where my mind dwells in an eternal moment divorced from time. . . . ○

GAS REVEALS EXTRAGALACTIC LIFE SOURCE

Scientists reported discovery in a nearby galaxy clouds of gas which suggest that the basic building blocks of life exist elsewhere in the universe as well as in our own Milky Way family of 100 billion stars.

The discovery was made by Dr. Philip R. Schwartz of the Naval Research Laboratory (NRL) and Drs. William J. Wilson and Eugene E. Epstein of the Aerospace Corp., Los Angeles, by means of the national Radio Astronomy Observatory's 11 meter radiotelescope at Kitt Peak in Arizona.

What Schwartz, only 27, and his colleagues found was enormous clouds of carbon monoxide gas in a neighboring galaxy known as M-33. Although considered "nearby," M-33 actually is nearly nine million trillion miles away in space from our own galaxy.

Carbon monoxide clouds were first discovered by radioastronomers in the Milky Way only two years ago. Scientists believe carbon monoxide is a "daughter" product of more complex chemical molecules, such as ammonia and formaldehyde, which appear to be widespread in the stars of our galaxy.



Dust and gas clouds in space contain all the elements necessary for life.

The Naval Research Laboratory said in announcing discovery of the M-33 gas clouds that many scientists believe ammonia and formaldehyde in the primitive earth's atmosphere and waters were "the basic building blocks of life" as it developed on this planet billions of years ago.

Schwartz said that finding carbon monoxide in a neighboring galaxy in-

dicates, as the NRL report put it, "that the presence of complex molecules in the interstellar medium is not unique in our own galaxy."

Schwartz, a native of Philadelphia, received his PhD in Physics from the Massachusetts Institute of Technology in 1971 and went to work for the Naval Research Laboratory shortly thereafter.

SPACE TELESCOPE

The National Aeronautics and Space Administration sent a four-man team to Caltech to tell local astronomers and scientists about the Large Space Telescope—a sort of earth-orbiting Mt. Palomar Observatory planned for the 1980s—and, in the process, to drum up support for this major unmanned space project.

Dr. C. R. O'Dell, project scientist from the space agency's Marshall Space Flight Center in Huntsville, Ala. and leader of the visiting team, told an audience of about 125 at Caltech's Baxter Hall that LST would provide astronomers with a magnificent opportunity to explore the deepest and darkest corners of the universe.

LST's Capabilities

The space telescope would be capable of seeing celestial objects five magnitudes fainter than the best ground-based

observatories can now detect, according to O'Dell. That is a factor of 100,000 times better.

The LST will collect both visual light and ultraviolet radiation from far-distant galaxies and objects on its polished 305 centimeter diameter mirror.

That size, of course, is smaller than the 508 centimeter diameter of Mt. Palomar's mirror. Nevertheless, astronomers in the audience remarked that the LST is still a large instrument and, because it would operate well above the earth's obscuring atmosphere, would represent a major advancement for optical astronomy.

Housed in a 1½ meter long, well-protected cylinder, the LST would weigh between 9,000 and 11,000 kilograms. It would be carried to an orbital altitude of about 550 kilometers above the earth by a space shuttle in the early 1980s,

according to O'Dell.

O'Dell told the audience, composed of university scientists and aerospace industry representatives, that the space agency was open to suggestions about the types of instruments to be mounted at the focus of the LST mirror. He also urged them to participate in the planning and selection of those instruments by applying for membership on different LST panels.

The project, estimated to cost about \$300 million, is now just entering its second phase, called preliminary design. It completed its first phase last year, when the agency decided it was a feasible and worthwhile undertaking.

But its most critical phases—development and operations—are still in the future. LST could still suffer the fate of countless other projects: death by budget cuts.

A CHANGE OF HOBBIT

If you're into hard science fiction, fantasy, sword and sorcery, "new wave," or any of the other sub-genres that make up the acronym SF, you may be interested in knowing that A Change of Hobbit is the place to go when you can't make it to London, New York, Berkeley, or Saddle River, New Jersey. Those are the only other places in the world that boast SF specialty shops.

It's a little like following the yellow brick road to Oz. First you look for the Kleenco Complex next to the Bruin Coffee Shop at Gayley and Kinross in Westwood, California. The street number is 1101. Wander through the maze of American enterprise: Xpress Copy Service, Income Tax Prepared—\$5, the laundromat. Bypass a steam-powered dress form that emits the same charm as the sweatshop scene in any documentary about the industrial revolution. Toward the back of the building is a staircase. Climb to the mezzanine; just follow the signs.

Through either luck or the guidance of a Tenzing Norkay, you'll find your way to A Change of Hobbit. Hobbit is L.A.'s only specialty shop in speculative fiction (or "science fiction," if you're that person who is still uncertain of the distinction between "black" and "colored").

Above the laundromat: "Not the proper place for SF, but the traditional role." That's Hobbit proprietor Sherry Gottlieb speaking. Born and raised in Los Angeles, except for a five-year hiatus to Berkeley and Europe, Ms. Gottlieb first got the idea for her bookstore while in London: "There was a store called *Dark They Were and Golden Eyed* where I'd buy seven or eight books at a time. It occurred to me that if I had my own store, I could get all the books I wanted."

Her wish became reality in February 1972 when A Change of Hobbit opened for business. Thus far, trade has mainly come from the UCLA student community. After all, is there any college student with pretensions to hipness who hasn't at least read *Dune*, *Stranger in a Strange Land*, and *The Ring Trilogy*?

SF isn't doing badly in the straight community either. Mark the success of films like *A Clockwork Orange* and *Silent Running*; TV movies such as *The People or Duet*; bad novels like Ira Levin's *This*

QUAKE PREDICTION

A trio of Soviet scientists recently reported "encouraging" progress in their experiments to find a reliable method for predicting earthquakes.

At a UCLA symposium with seismologists from universities throughout Southern California, the touring research team reported it had predicted successfully three earthquakes in Russia, including one which reached seven on the Richter scale.

The team's research includes noting dramatic changes which occur in the earth's surface just before quakes occur and developing theories which might explain how the changes happen.

'Premonitory Signs'

These changes, or "premonitory signs," may occur from a few minutes to months before a quake is registered. They include:

- Sharp increases in the recorded numbers of small quakes along fault zones;

- Changes in the relative velocity of the seismic waves released by the tremors.

- Tilting and deformation of the ground in the quake area;

- Increases in the electrical conductivity of rocks in the vicinity;

Gas Isotope

- Changes in the level of gas isotope content in bore hole water in the quake zone.

Using some of these signs, the scientists—Drs. M. A. Sadovsky, I. L. Nersesov and S. K. Nigmatulaev—have already predicted quakes in different parts of the Soviet Union.

The quakes were forecast about two weeks in advance, according to Nersesov.

Sadovsky, the leader of the research team, said he and his colleagues are "very optimistic" that earthquake prediction will become a reliable tool in the near future, and may account for vast savings in human life and property damage.

Perfect Day and *The Throne of Saturn* by Allen Drury; good novels such as Nabokov's *Invitation to a Beheading* by Kurt Vonnegut, Jr. Then there are individual freaks turned on to H. P. Lovecraft, James Branch Cabell, Robert E. Howard (CONAN), Edgar Rice Burroughs, *ad infinitum*.

It was only logical that someone should come up with the idea of focusing all the above in one location. Thus A Change of Hobbit.

Once inside the store's Tolkienesque walls (robin's egg blue, with fleecy clouds), you discover more than SF. There are underground comics, a pinball machine, a table of Chisholm campaign literature (definitely not science fiction), and other things much stranger than you'd care to suspect. Yes, Morlocks in the basement. Trolls under the bridge. Bandersnatchii in the closet. *Weird* things.

And there is SF too, of course; three walls of it. Old and new. Both used and optically virgin. What you see isn't necessarily all you can get. Owner Gottlieb will order anything you want, paperback or hard cover. She takes cash for books but will also buy, trade, or dicker. It's the kind of unstructured, personal attention you can't get elsewhere.

That's probably the bottom line: informality and character—the shop brings

with it. Customers are urged to browse. There are chairs for droppers-in to sit and talk. A hotplate keeps water warm for tea. It's that kind of special ambience you find in a good pipe and tobacco shop, except postdated in the future.

Another uniqueness of the store is its rogue's gallery of Famous SF Authors. Out-of-towners can hang around Schwab's all they like, but the real stars are at A Change of Hobbit. It's not unusual for local SF writers to drop in, sign their books, thrill the customers, and, hopefully, increase their royalties. In addition, Sherry Gottlieb captures their souls with a Polaroid, to set on a shelf for all to view. Harlan Ellison, Norman Spinrad, David Gerrold and others are on display. Or at least their pictures are. If you feel the aberrant culture exhibit at the Smithsonian would possibly interest you, then the Hobbit's snapshots ought not be missed.

Hours should be mentioned: open Tuesday through Saturday, 10:30 to 5:30. Open until 8:30 Tuesday night. You can get the place on the phone by dialling GREAT SF—of course.

Whether you're into Bradbury, Borges, or Burgess, investigate A Change of Hobbit. It'll beat spending Arbor Day in Saddle River, New Jersey.

Ed Bryant

UNDERGROUND NUCLEAR PLANT SITING WOULD DELAY NEEDED POWER 8 YEARS

SAN DIEGO, Calif.—Shifting the proposed San Onofre nuclear power plant expansion to an underground site would delay the project more than 8 years, add almost a billion dollars to its cost, and result in an increase of more than 50 per cent in the cost of electricity from the plant, a Southern California Edison Company witness testified recently before an Atomic Energy-Commission hearing board.

Undergrounding the proposed two new nuclear generating units is, therefore, not a practical alternative, Orlando J. Ortega, Edison's manager of generation engineering and construction, told the AEC's Atomic Safety and Licensing Board.

The "lead time" between a decision to go underground and the beginning of full-power operation would be 15 to 16 years, Ortega stated, so the new units would be of no help in meeting power demands in the late 1970's.

The Edison engineer said his estimates were based on the construction design outlined in a study prepared by the California Institute of Technology.

Should underground construction be attempted, Ortega calculated that construction delays would total 58 months and licensing delays 40 months, or approximately an 8.2 year overall delay.

This delay would result in a total cost penalty of approximately 94 per cent, Ortega testified—not including capital cost differences associated with changes in plant design and equipment. This would amount to "close to an additional one-billion dollars," the Edison executive stated.



The California plant which is the center of the underground siting proposal.

Orbiting Power Plant

An orbiting power station several miles long was proposed recently as a possible environmentally clean answer to the world's demands for electrical energy by the year 2000.

The huge satellite would convert heat from the sun into electricity and beam the power by microwave radiation generators to huge receiving antennas on earth.

The idea was outlined by Dr. Peter E. Glaser, vice president for engineering sciences of Arthur D. Little, Inc. of Cambridge, Mass., in a report to the 139th annual meeting of the American Assn. for the Advancement of Science.

"Power from space has the potential to provide an economically viable and environmentally and socially acceptable option for power generation on a scale substantial enough to meet a significant portion of future world energy demands," Glaser said.

Always in Sunlight

The orbiting power station was described by Glaser as a formidable undertaking, but one that seems within reach by the 1990s if enough technological and financial resources are committed to it.

The massive satellite would be positioned in a stationary orbit 36,000 kilometers above the equator where it would be in sunlight for nearly 24 hours a day. It would require an improved version of the space shuttle being developed to transport equipment weighing a total of 11½ billion kilograms into orbit. Such an assembly operation would require 500 shuttle flights.

The proposed orbital power plant, with rectangular solar panels roughly 12 kilometers long and 4.8 kilometers wide, would generate about 5,000 megawatts of useful electrical power.

Glaser said such a space generator would "permit society to look beyond the year 2000 with the assurance that future energy requirements could be met without endangering the planet earth."

Pictures Lauded

In another session discussing space technology, Dr. Vincent E. McKelvey, director of the U.S. Geological Survey, said the space agency's earth resources technology satellite launched last July was providing "most impressive photographs" helping man inventory and manage earth's dwindling natural resources. He said it was too early to fully assess the satellite's potential but that its pictures already have turned up previously undetected geological structures in Nevada and Oregon that may hold new sources of copper ore.

NEW SPEED OF LIGHT

BOULDER, Colo.—Scientists at the National Bureau of Standards laboratories here have discovered a more accurate way to measure the speed of light—more accurate by about 15 thousandths of 1%.

The scientists have announced they determined the speed of light 100 times more accurately than any previous measurement.

Although the difference is infinitesimal, it becomes significant to researchers dealing with interplanetary measurements.

The measurement was obtained from Dr. Kenneth M. Evenson's work with laser beams.

Briton Runs Car

from page 6

according to Bate, is that the residue of manure from which the gas is produced makes excellent fertilizer.

There is one problem, Bate conceded, and that is that "not everyone has easy access to manure . . . If you live in a flat in the city your neighbors probably wouldn't want you running in and out with buckets of manure."

While accessibility may be a problem, Bate thinks manure (and human excreta) and the methane gas that can be produced from it should be considered an important energy source.

"It's the only alternative," he said. "Oil is drying up, the world's running out (of other fuels), but as long as we have humans and animals there'll be methane gas."

One human, Bate calculates, produces enough waste each day to make "one-fifth cubic meter of methane." It takes, by his calculations, about 1 cubic meter of methane to equal five liters of gasoline.

Bate says interest in his methane gas converter for automobiles has picked up remarkably because of all the public debate over the energy crisis and the U.S. auto industry's protestations about not being able to produce a "clean car" by 1975.

"I've had thousands of letters from all over the world," Bate said, and "lately my wife and I have been up to 3 o'clock in the morning some days answering them."

He figures he has sold well over 1,000 of his patented converter devices. That hardly represents a mass conversion among the world's millions of motorists.

Bate already has become a hero among the young back-to-nature people who like commune-style living.

He has dozens of clippings from so-called "underground" newspapers and magazines describing his method of making methane gas from manure. He has had scores of letters from communes which convert manure into methane gas and use it for heating and lighting.

Bates lives with his wife in an isolated 400-year-old stone cottage about seven miles from this west-country Devon town.

He is 65, has one wooden leg, great shocks of wild white hair, gets about with the help of a cane, wears glasses with broken rims, and dresses in straw-colored corduroy trousers, yellow shirt and bow tie, heavy-duty suspenders and a tan jacket.

The idea of running his car on methane gas first occurred to Bate at the time of the Suez crisis in 1956 when a shortage of gasoline developed.

"Everyone was talking about alternative sources of fuel," he said, and he decided to do something about the manure-methane process, on which none other than Louis Pasteur had written a paper in 1884.

Bate now has two methane "digesters" bubbling away in his garage-workshop and he gets the pig manure to keep them going from a nearby farmer.

He estimates the cost of his methane gas at less than 1 (U.S.) cent for the equivalent of a liter of gasoline.

"It takes about 14 days" to get the first batch working, Bate said. And the best way to start, he said is with a combination of pig manure ("it supplies the heat") and chicken droppings ("good for nitrogen"). It also helps to add some water and maybe a little straw.

Once the stuff starts working it will go on indefinitely as you add fresh manure, so long as you leave a little of the previous batch in the digester."

Any kind of manure will work, he emphasized, and he thinks city dwellers especially who are always complaining about dog litter are overlooking a great way to turn a problem into an asset.

The converter device Bate has developed can be removed and switched to another car at any time—so you only have to buy one. It is also easy to rig up the car so that it can be run on either methane or regular gasoline alternatively—which is nice if you suddenly run out of manure.

And, he said, it will work on any horsepower engine so it can be used on anything from a power mower to a Rolls-Royce.

Atomic Clocks

from page 13

the American atomic time scale and the international time scale maintained in Paris."

Difference, under international agreement, must be no greater than 1,000 microseconds (millionths of a second). So every year or so NBS buys a first class seat on a transatlantic jet and sends a portable atomic clock on a trip to Paris.

It is accompanied by a physicist "to carry out the measurements and insure careful handling of the continuously running clock."

The most recent comparison of NBS and Paris time scales showed a difference of less than 150 microseconds. This was in September, 1971. Adjustments made as a result since then have resulted in an estimated difference of less than three microseconds.

Periodic Trips

The atomic clock jet trips are repeated periodically to maintain the desired agreement between time scales.

This agreement is needed "to avoid international ambiguities when specifying the exact time that events occur, especially scientific or astronomical events, and to permit international synchronization of clocks."

If nations developed their own independent time scales without coordination, these scales would diverge over the years until, conceivably, 8 o'clock in the United States, might coincide with half past 8 in, say, Canada.

The portable clocks always ride in the first class section where they can be plugged into the aircraft's power system. So if you find yourself seated next to one of them, says NBS, just ask it what time it is.

FLYING ROCKS

ELK CITY, Okla.—A patch of massive boulders, some of them weighing more than 27,000 kilograms, has erupted overnight on a previously smooth pasture south of this western Oklahoma city. And an expert says more boulders still may emerge.

"We aren't able to make any statements just yet on what we think happened," Dr. Robert Fay of the Oklahoma Geological Survey office in Norman said, "but you can tell that the rocks blew out of the ground."

Some of the deepest oil and gas wells in the world—up to five miles deep—are located in the Elk City area.

The boulders, some of them almost 6 meters high, burst out of the ground apparently without causing any immediate notice.

"Some of the rocks that will weigh over 45 kilograms were blown 50 meters away," Fay said.

"There are indications that the rocks are still emerging."

BOOK REVIEWS, from page 13

A SPECTRUM OF WORLDS.

Thomas D. Clareson, Editor.
Doubleday, \$5.95.

The big thing these days seems to be reprint anthologies, and this is another, but with a slight difference. Included are 14 stories, from Ambrose Bierce to Robert Silverberg, some of which you may not have read before, and an introduction and notes for each story by Thomas D. Clareson. Mr. Clareson is a professor of English at the University of Wooster, Ohio, and his previous publications include *Science and Society: Readings at Midcentury*, and *Victorian Essays*. He is also a member of the editorial board of *Victorian Poetry*. All of which may tell us something about the qualifications of Mr. Clareson as a science fiction anthologist. Then again, it may not, but Mr. Clareson makes an assumption which we have run into before from members of the academic community who comment on science fiction; that readers of science fiction are stupid and need to have the *real* meaning of the story explained, and that often the author is also too dense to understand what he has written. Mr. Clareson has written extensive notes at the beginning and end of each story to inform of us of the deep, *real* and significant meaning of each story, and, if you can manage to ignore those comments, it's a pretty good book.

THE REGIMENTS OF NIGHT.

by Brian N. Ball.
DAW Books, \$9.5.

Some are saying that the new wave has passed, and behind the crest is the trough of old-fashioned, zap! blood all over the bulkheads, science fiction, making a comeback as a reaction against the excesses of the new wave authors. We don't agree. We think that good, solid adventure science fiction has always been with us, and Brian Ball's *Regiments of Night* is a pretty good example. It could be better, and we're sure Ball will do better in the future. In the meantime, here's an easy and entertaining way to spend an evening.

AMONG THE DEAD.

Edward Bryant.
MacMillan, \$5.95

If you're tired, don't want to go to sleep, and think perhaps a good fright is just what you need, *Among The Dead* is for you. Or, if you have a weak stomach, and want to clean it out, you'll find *Among The Dead* excellent. And, if you're a science fiction fan (or even if you're not) who has a hatred of science, you'll love *Among The Dead*. But, if you're a plain, old-fashioned science fiction fan, you probably won't care much for the book. Not that it's a bad book. It isn't. Ed Bryant is one hell of a craftsman with words. It's just that the 17 stories which live (?) between the covers of *Among The Dead* are a bit too much. Alone, they were a nice break from the more traditional science fiction, but grouped together they're like having a steak appetizer, a steak dinner, and then steak for dessert. Just too damn much! And, finally, the less said about the cover, which might have looked good on a 1952 horror magazine, the better.

A PRIDE OF MONSTERS.

by James H. Schmitz.
Collier Books, \$1.25.

Five reprinted BEM stories from out of the past by a master of the old-style science fiction. If you're an adventure science fiction fan, this book is for you. If, though, you have to ask a friend what a BEM is, forget it.

PROTOSTARS.

David Gerrold, Editor.
Ballantine Books, \$9.5.

In this case the protostars are not physical objects, but "the news stars of science fiction." Writers just coming up, and while some of them are on the farthest reaches of the "new wave," some are right there in the mainstream of science fiction, and all of them have something to say. While the book is a little rough in spots, dollar for dollar, or maybe we should say 271 pages for 95 cents, it has to be one of the best literary values on the market today.

THE ASTOUNDING-ANALOG READER, VOL. 2.

Harry Harrison and Brian W. Aldiss, Editors.
Doubleday, \$7.95.

Forty-four years ago a new magazine was started — *Astounding Science Fiction* — which immediately began to set new standards in the field. The name was later changed to *Analog*, but the man who had edited it since 1937, John W. Campbell, stayed on until his death two years ago, maintaining editorial continuity and setting standards that every other magazine in the field, including *Vertex*, strives to maintain. Campbell had a fine touch for picking stories, and authors, with wide and long-lasting appeal, and in this definitive history of *Astounding-Analog*, Harry Harrison and Brian Aldiss have picked the best from across the years. Volume One was excellent, and this second volume is even better. Containing such classics as Sturgeon's *Thunder and Roses*, Arthur Clarke's *Hide and Seek*, Tom Godwin's *The Cold Equations*, Eric Frank Russell's *The Waitabits*, and Harrison's own *Rescue Operation*, volume two of *The Astounding-Analog Reader* is a must on any S-F fan's bookshelf.

THE PEOPLE OF THE WIND.

by Poul Anderson.
Signet, \$9.5.

Poul Anderson has once again done his usual excellent job of blending elements of fantasy and a science fiction world to produce an eminently readable book, if you can ignore the cover, which might have been better placed on an Edgar Rice Burroughs reprint.

DILATION EFFECT.

by Douglas R. Mason.
Ballantine Books, \$9.5.

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